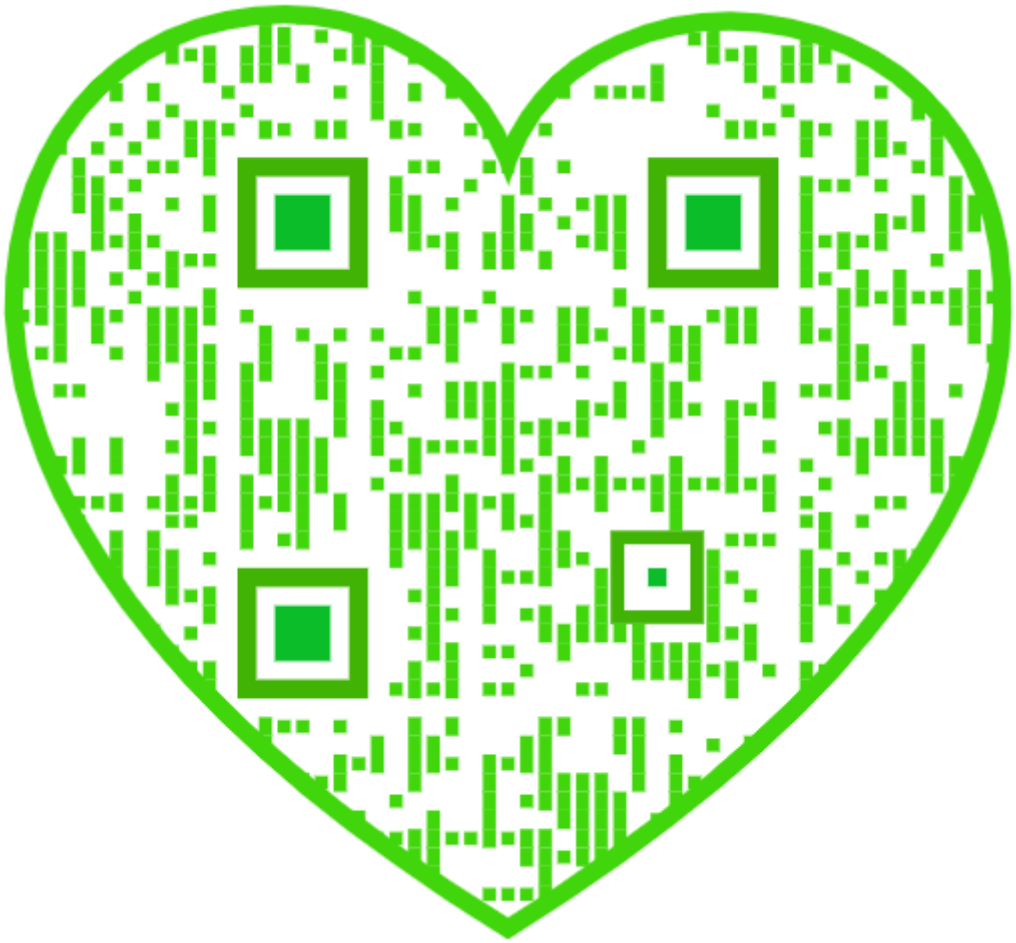
SHELTER FOR LIVING

ERNEST PICKERING



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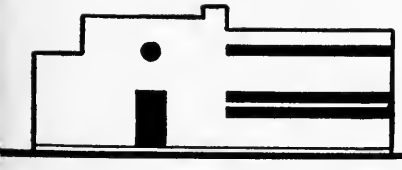
SHELTER *for contemporary family life is architectural space which has been conditioned for use, comfort, and appearance.*

SHELTER FOR LIVING



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Dedicated to

A HAPPY FAMILY LIFE

PREFACE

This book was written primarily for students in schools of architecture and home economics, and for architects, builders, and prospective home owners. Although it is directed chiefly to those who plan, build, remodel, and occupy, or hope to occupy, single-family detached dwellings, it should be of value to those who must select, evaluate, and live in rented houses or apartments. The text and illustrations are, therefore, presented as a means of teaching basic principles which may be applied to the design and choosing of various kinds of habitations—single or multiple, inexpensive or medium-priced.

Even though the book deals principally with the problems associated with home ownership in general, it does not neglect those other aspects of shelter. It emphasizes the necessity of visualizing the relationship of single and multiple dwellings to a city and regional plan. It calls attention to the need for decent habitation for those in the lower-income brackets and also to the limitations and the possibilities of low-cost and low-rent housing. While concentrating upon a phase of housing concomitant with the interests of those who own, or expect to own, their homes, it presents an analysis of those other types of shelter needed by the remainder of our population.

This approach to the subject of planning homes which will serve as satisfactory backgrounds for congenial family life differs in several respects from that of some other books upon the subject. These others allow discussions of style, size, or cost to dominate; this book emphasizes the physical-social environment in which we live, the resulting activities in the home, and the functional house which should develop in response to these influences. Thus this approach is based upon function rather than style—upon use rather than tradition. In spite of this emphasis, the related items of appearance, cost, construction, and equipment are not omitted; in fact, the attempt is made to assign all the factors which contribute to the design of a successful home to their proper places in the process of planning "shelter for living."

In coordinating the sociological, psychological, and economic aspects of housing with those associated with home management, interior decoration, aesthetic design, and architectural planning, the author is especially in-

debted to his colleagues at the University of Cincinnati who teach in these various fields. In this connection, he wishes to acknowledge the assistance of Professors Marion F. Breck and Alma J. Knauber of the School of Household Administration, Professors Jessie L. Paul and Harley J. McKee of the School of Applied Arts, and Professors James A. Quinn and James Vaughn of the College of Liberal Arts. He is also indebted to Dean Rexford Newcomb, of the University of Illinois, and to Ellery F. Reed and George Marshall Martin for their help and suggestions. Special credit is also due Professor William S. Wabnitz for his assistance in editing the text. Most of the photographs used for the illustrations were lent by various firms and organizations throughout the country, and the author is grateful for their cooperation and interest. Without the assistance of those whose attitude toward or interest in the design of dwellings is somewhat different from the author's, a book of this kind would be difficult to write.

ERNEST PICKERING

Cincinnati, 1941.

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PART ONE

THE FUNDAMENTALITY OF SHELTER

Chapter 1

SHELTER IN A CULTURE

The house is one of the most important necessities of mankind. Since the dawn of history, shelter for the activities of families has been a conspicuous feature of every civilization, whether primitive or advanced.

We like to think of our own culture as very modern but we are not much different from primitive man. We still eat, sleep, work, and play, and it is only in the manner of doing these things that we are unlike our early ancestors. We must all have shelter, and, while it may now be more beautiful and comfortable, its purpose is still to provide safety and protection. This thing which we call civilization is often only a thin veneer over our primitive impulses, habits, and customs. Before we discuss any of the products of civilization and particularly that specific one called a house, let us scratch through this veneer and examine some of the basic activities and needs of mankind.

One of the early discoveries of primitive civilization was made thousands of years ago when a family group realized that fire would cook the meat of a slain animal. Food tasted better cooked than raw, and man soon found that it was more convenient to consume this food from the top of a flat stone than it was to hold the hot meat in his hands. Thus our present-day tiled kitchens and sunny dining rooms had their beginnings in the corner of a smoky cave. When wandering hunters were invited to join the family around the fire and recount their daring deeds in words and song, social intercourse began. This fireside has maintained its position as the center of family life, and even today some deep, inner desire prompts the inclusion of the fireplace and its accompanying flame in the modern living room.

But architecture did not become conspicuous as long as men were hunters. After our early ancestors found that fruit and grain could be cultivated and that animals could be domesticated, they became less nomadic and the need for permanent shelter arose. Tribes were tied to the soil. They had to wait for crops to mature, and it was worth their while to build more

ambitious dwellings. Thus the early manifestations of architecture began, and the material apparatus of a culture appeared:

implements
buildings
furnishings
clothing

things which were built or manufactured.

Necessities of Man

As a civilization developed it was apparent that mere physical things alone were not sufficient for the proper growth of a desirable society, and so certain other necessities became conspicuous as contributing to man's existence. While their interpretation may vary with the period and the place, the importance of these necessities remains unchanged, and we have today, as yesterday, the following:

1. Material necessities:
   Food, clothing, shelter.
2. Spiritual necessities:
   Religion, recreation, aesthetics.
3. Intellectual necessities:
   Government, education, science.
4. Social necessities:
   Intimacy, position, morals.

The Importance of Shelter

It is in the development of one of these material necessities, shelter, that we find a reliable record of the progress of mankind. Architecture is the most conspicuous physical thing of any civilization and as such is an accurate manifestation of cultural standards. The dwellings built by the Egyptians, Greeks, Romans, or Normans indicate the character of the social order of these peoples. They reveal the nature of the wealth, customs, industries, and arts of a period just as clearly as if we had mingled with the crowds in the Forum of Trajan or had been spectators at a tournament in Normandy. Houses cannot help but be the expressive product of a civilization, revealing the amount of leisure time, number of servants, types of furniture, habits of eating, products of craftsmen, and all the innumerable things which are associated with one's existence.

But, of course, we have not always had architecture as we think of it today. When man is conquering a new frontier, his primary thought is to provide a mere protective shelter. Such shelter is purely utilitarian and

for the sole purpose of shielding the occupant from the unfriendly elements of nature. With his physical needs satisfied—the need for food, clothing, and shelter—man has a surplus of time and energy, the surplus necessary to the development of those refining agencies which we call art, literature, education, government. Man does not have to spend all his time hunting in the forest or plowing in the field; he controls his physical destiny and can give thought to his spiritual. He sees beauty in the forms of nature and transfers these resulting patterns to his personal belongings. He decorates his weapons, clothing, and utensils. This is the beginning of industrial art. The daring deeds of tribal raids are repeated at each listening fireside. Strolling minstrels give romance and authenticity to stories of valor and love. This is the beginning of literature. Man becomes critical of the hut, tent, or cabin in which he lives. He rebuilds, giving more thought to conveniences, construction, materials, shape, and decoration. This is the end of mere building and the beginning of architecture.

Throughout all these activities is the evidence of the quest for beauty. Man's idea of beauty may vary with the time and the country, but the urge to improve the appearance of things is constant. We hear it said today that anything which functions adequately is sufficiently beautiful. Appearance is relatively unimportant as long as the object—whether vase, automobile, or house—does the thing for which it was made. This philosophy is contrary to history. Functionalism alone cannot satisfy for long, either today or tomorrow. Beauty of form, texture, color, pattern, or composition must eventually find expression. Human desires will not have it otherwise.

Thus domestic achitecture is

1. Physical,
   providing *shelter.*
2. Beautiful,
   because of *aesthetics.*
3. Efficient,
   as a result of the *science* of building.
4. Intimate,
   because man desires *privacy.*

While we are talking about shelter, we should realize that, in its broadest sense, all architecture is shelter. It shelters the many activities of mankind. There are churches to shelter religious worship, city halls to shelter municipal affairs, and houses to shelter family life. However, the term, in this discussion, will be used in a limited sense, to mean "shelter for living," or the dwellings of man.

The Social Significance of Shelter

Shelter of any kind, to be completely meaningful, must be related to its accompanying social order. This social order is the result of the attempts to satisfy the needs of man—the material, spiritual, intellectual, and social.

Things—anything—may exist in a physical sense but they have meaning only because of their place in a social pattern. Consider, for instance,

food growing in the field
or
clothing displayed in a shop.

They are inanimate objects whose ultimate social significance depends upon their use by a consumer. If we had never seen wheat or trousers, we would simply eye them in a detached or suspicious manner depending upon our mood of the moment. But when experience brings these things within our sphere of activities the situation is quite different. When palatable food and well-tailored clothes contribute to the health, confidence, and success of an individual, then these things cease to be unfamiliar and become related to social behavior.

Dwellings are likewise unimportant until they become associated with man's interests. One cares little whether a house is green or white, brick or stone, ugly or beautiful, unless it fits into his scheme of existence. Its social possibilities give meaning to its material qualities.

Imagine, for a moment, a frame house. In it is a chair. This isolated house has never been lived in nor has the chair ever been sat upon. They are inanimate wooden objects which have not yet fulfilled their purpose. No one knows whether they are comfortable, sturdy, or beautiful. No one knows whether they will function adequately because they have never been tested by human experiences. As soon as they have been subjected to the modifying influences of use, they become important to a culture and contribute to the development of that culture.

Therefore, we may examine houses, not so much from the standpoint of materials, cost, size, or style, as from the standpoint of their expression of an existing social order. Shelter for living must be living, not stagnant; animate, not inanimate. It should express, not reiterate; lead, not follow.

Life can be breathed into inanimate objects only by the living. Things can be given meaning only by people. It is only through use by individuals that food, clothing, and shelter become related to the activities of our daily existence. Since individuals seem so important in the scheme of things, let us examine some of man's fundamental propensities or natural inclinations and see if we can understand why he lives as he does.

Chapter 2

SHELTER AND MAN'S PROPENSITIES

Man's native propensities are numerous—but in the final analysis they all seem to deal intimately with his struggle for existence. We human beings seek food and companionship. We explore strange places and situations and we are cautious of the results. We domineer and defer, acquire and relinquish, laugh and frown. We run the gamut of human emotions, indulging these and those propensities, which form the basis of our mental life and the pattern of our social order.

Impulse and Intellect

If we wish to simplify, we may say that individuals are governed by

impulse
and
intellect

Impulse or habit produces the reflex reactions of *curiosity* and *fear*, whereas intellect enables one to *reason* and to reach a decision by the judgment of evidence.

Individuals react impulsively to a set of circumstances. Whether they are habits, culture biases, primordial warnings, or motor reflexes, there is little doubt about the importance of certain reactions. Even though there may be a divergence of opinion about instinct in higher mammals, there is evidence that man's basic biological impulses are deeply rooted.

We are naturally curious. It would be a dull world if we were not. We would be phlegmatic and stupid. Instead most of us are plagued with curiosity, and curiosity brings progress. We are willing to try out new styles in clothing, new kinds of furniture, and new types of houses. However, along with this inborn sense of curiosity there is a stabilizing warning of caution. Will our clothing be in style, the furniture comfortable, or the

house practical? We fear; we are afraid of the results. We reach out tentatively, hesitantly, and we retreat quickly if disturbed.

Primitive man was perhaps governed largely by culture bias and was more reluctant to accept innovations in implements and dwellings. Modern man depends more upon intellect or reason. He weighs the evidence in the light of experience and by careful analysis arrives at a decision. He discards unfounded fears and allows his curiosity about new things to be tempered by the influence of scientific evidence. New ideas in home building are thus judged by standards of usefulness and beauty.

Man's Desires

The innate propensities of individuals produce fundamental desires. These desires play such an important part in our existence and are so definitely related to our need for houses that it is necessary to analyze them for our future guidance. These desires have been classified as:

the desire for
- adventure
- security
- prestige
- companionship
- comfort

Adventure is usually the result of a curious nature. With primitive man, curiosity, or the desire for adventure, was responsible for the acquisition of the taste for cooked food, for the development of new designs for ornaments, and for the opening of new frontiers. With modern man the desire for new experiences leads him to travel, to attend many types of entertainment, to indulge in new hobbies, and to buy new furnishings for his home. Progress in the design of dwellings is partly due to the spirit of adventure, the willingness to try out something new. Many people build only one house in a lifetime, and such a venture is perhaps their largest single undertaking.

However, curiosity is often tempered with fear. Impulse is stayed by caution. This fear of the unknown fosters a desire for security.

Security is probably one of the most important of the basic and natural desires. Security is identified with self-preservation. Without security from those unfriendly things against which we are aligned, mankind can make little progress. Security means freedom from fear, anxiety, and harm. It suggests protection from those things which are considered undesirable. There are several types of security, but one of the most conspicuous is

the economic. It is essential that we have a job or position which will insure the necessities of life and a surplus beyond for a more complete enjoyment of these essentials. Then there are religious and political security, which guarantee freedom of worship, speech, and self-determination, conditions indispensable in a democracy. But most important of all is physical security, which provides shelter from the unfriendly overtures of nature and man's fellow creatures. We need a shelter which will protect us from sun, rain, and cold, and from nightly marauders. Domestic architecture, again, results from the satisfaction of one of man's fundamental desires.

Prestige. The wish for security, in turn, encourages the desire for prestige. Cities attempt to gain prestige by the efforts of ambitious chambers of commerce and the erection of magnificent city halls and railway stations. Their curve of progress must be always upward in order to keep ahead of the neighboring rival in population and wealth. Individuals are likewise ambitious. If there are any who are not, we condemn them as shiftless and lazy. This effort to gain prestige stimulates, drives, urges; like the wish for adventure, it brings progress.

There are many motivating influences which are instrumental in the securing of prestige, a few of which have to do with social, political, intellectual, and economic activities. A woman may belong to many clubs, entertain a great deal, and have ambitions to be a social leader. A man may aspire to the governor's chair and play his political cards with that in mind. A college professor may hope to win high acclaim in his particular intellectual field, while a banker may work for the consummation of a big business deal which will make him a power in the economic world.

Individuals do many things largely in order to win recognition. They want to play a good game of tennis, partly for recreation and partly for the satisfaction of doing a thing well before those who watch. They take pride in the new home which is being built and in the furnishings which will complete it. They may build primarily for security and shelter but they are greatly pleased when their friends comment upon the size and beauty of their houses. Thus the desire for prestige furnishes a strong motive for the erection of dwellings. We must keep up with the Joneses, and, if their home is large and gaudy, ours must be also. (See page 107.)

Companionship. The atavistic wish for security which we found to be so important is accentuated by the desire for companionship. Man is a gregarious creature. His normal desire for prestige forces him to seek the company of others. He likes to be with others of his own kind, mentally and spiritually as well as physically. Not only does he derive pleasure from

this rubbing of elbows but also his sense of security is increased by a definite relationship with his fellow citizens. He feels safer and more secure if he is part of a social pattern, if he belongs to a specific group all with similar customs, beliefs, and possessions. Man builds a house similar to those owned by his friends because he is afraid of mild ostracism if he displays radical tendencies. If his ideas about dress, houses, and conduct are not sympathetic with those of his immediate group, he is usually compelled to seek more appreciative friends. It is this influence of human association that gives momentum to a style or movement in house design once it has gained sufficient headway.

The gregariousness of the human race has been responsible for many types of buildings of the past and present. Because individuals like to associate with each other we have clubs, theaters, and stadiums. The family is the basic form of gregariousness, and without family life we should have little need for homes. Ever since primitive peoples have mated in caves, tents, or huts, there has been a need for dwellings to form the background for human companionship. The present-day living room serves the same purpose as did the cave of the Neanderthal man. It provides a place for songs, games, schemes, and conversation. Only the physical aspects have changed; a smoke-filled interior has given way to an air-conditioned section of "cosmic space."

There is little doubt that the wish for approval often tends to retard progress. Those who would start a new philosophy, a new art, or a new architecture need not be too impatient with slow progress or lack of success. Individuals impulsively move with the majority; not against. They are inclined to conform to a pattern. For evidence, look at the waves of bungalows, Cape Cod cottages, and pseudo-English houses which, once started, have engulfed our country in recent years. There is security in numbers, numbers which create a market and a demand for a particular style. Individuals may eagerly accept certain established fads in dress and home furnishings, but the human inertia to major change is something not to be reckoned with too lightly. It is only the courageous who will adopt advanced ideas in house design and construction.

On the other hand, the desire for acclaim may sometime encourage experimentation, which in turn fosters progress. If an individual allows his wish for adventure to overcome his innate caution, he may build an ultramodern house partly as a means of attracting attention. It is possible that some of the new movements in domestic architecture may be instigated largely as surprise-producers, to jar a lethargic public out of a self-satisfied drowsiness.

Comfort. While our list of human wishes and their relation to domestic architecture does not pretend to be complete, we cannot leave it until we have discussed man's desire for comfort. It is related to security but is not necessarily part of it. Naturally we should like to have our shelter provide comfort as well as protection but we could exist in a hut devoid of many of the so-called comforts. The warmth of enclosing walls is a necessity—the addition of luxurious furniture is comfort. After man's barest necessities have been provided, and there is a surplus of time and energy, perhaps one of his most compelling urges is his desire for comfort, both spiritual and physical. Spiritual comfort means a feeling of well-being, of contentment—encouraged by the presence of adequate material things. Physical comfort depends upon the qualities of tangible possessions—upon comfortable homes, chairs, beds, clothing—in short, all the proper facilities for work and relaxation. But conveniences must precede comforts, and necessities must come before conveniences, so that man has, in sequence, sought and secured

necessities
conveniences
comforts

The necessities of life may be defined as those requisites which are needed to insure strength and health for the performance of daily occupations.

The conveniences are those things which enable individuals to maintain their place in society and to perform daily activities with the minimum amount of physical effort.

The comforts are associated with the possession of material things beyond those enjoyed by the average person. As comforts become more common, they pass into the category of conveniences and the standard of living is thus raised.

Man's interpretation of necessities, conveniences, and comforts has varied with time and place. His social and economic life—methods of manufacturing, transportation, and construction—determines the type of luxuries to which he has access. The necessities of today were the comforts of yesterday. From the time man crawled into a dark hut on his hands and knees until he walked into a cheerful living room, there has been a steady transition from necessities, to conveniences, to comforts. Modern planning is based largely upon the idea of added comfort. During the Middle Ages, when there was a tax on windows and window glass, openings were a luxury. They are now necessities. House plans have generally been made simpler and the rooms better related to each other. This is for added con-

venience in use and maintenance. There has been a steady advance in the improvement of lighting facilities—candles, whale-oil lamps, kerosene lights, gas lamps, and now the various forms of electric illumination. In fact it is in the field of mechanical equipment that the greatest strides have been made in recent years. Compare the modern bathroom and laundry room with those of fifty years ago or contemporary heating plants with the furnaces and stoves of our grandfathers. The mechanization of today was undreamed of a few decades ago.

And progress will continue—inquisitive, ambitious, and gregarious man pushing ahead in his search for adventure, security, prestige, companionship, and comfort.

PART TWO

THE PHYSICAL-SOCIAL ENVIRONMENT

Chapter 3

THE PHYSICAL ENVIRONMENT

In pursuing activities and satisfying needs, man is constantly aware of his environment. Environment consists of those conditions, influences, or forces which surround the object under consideration and which direct its design or growth. Individuals and the institutions by which they exist are conditioned by environment. This environment is both physical and social —each aspect influencing the other. The physical setting of a culture has a definite fundamental effect upon modes of living, and, on the other hand, the social pattern tends to modify the restrictions imposed by the forces of nature which form the background of our existence. Thus man's activities are shaped by this combination of natural and man-made phenomena. If we are to study the design of dwellings, we must consider the basic influences of this physical-social setting.

The Elements of Nature

The natural or physical forces which modify the lives of peoples and affect the development of their domestic architecture are climate, soil, resources, topography, and geographical position. These provide the physical setting for all man's activities, and, since it is desirable to set the stage for this little play dealing with the home before we bring on the actors, these forces require a brief consideration. Soil and resources help determine whether communities are to be interested primarily in farming, mining, shipping, or manufacturing. A community's position with reference to oceans or mountains influences its climate, while its topography may affect the manner in which its inhabitants live. The winds, sun, and rains help determine occupations and types of dwellings.

The Elements of Climate

Climate is so closely related to the development of domestic architecture that we should examine it in detail. The elements of climate are

wind, sun, moisture, and temperature

Winds vary with the seasons in temperature and direction. The prevailing cooling breezes of summer should determine the location of sleeping rooms and living areas, while the winds of winter necessitate adequate protection from their frigid blasts.

Sun may be friendly or unfriendly in its effect upon man and his dwellings. There are times when we like the sun and its influence and there are other times when the sun is something to be avoided. These times vary with the seasons and the geographical location. In the more temperate months of the year the living room, porch, and terrace welcome the mild and beneficial rays of the sun and should be placed so that they will receive these blessings. When the sun becomes an enemy instead of a friend, porches and projecting roofs may afford protection from the heat and glare.

The amount of moisture also affects the design and construction of dwellings. Houses must be built to keep out rain and snow, and one of man's most persistent architectural struggles has been an effort to make his buildings impervious to moisture.

The average temperature of a locality is the index of its climate—warm or cold—and influences the mode of living of its inhabitants. In a mild climate, the house is often rambling in its plan arrangement. Outdoor activities are encouraged, and porches and terraces make it possible to live outside the confines of walls and roofs. Living areas are related to gardens, and a feeling of openness is thus conspicuous. In the colder climates, houses are more compact and enclosed, as with the farmhouses of New England. Here the simple rectangular house is closely connected with the barns by kitchens, woodshed, and other service units to permit the performance of the daily chores with the maximum amount of protection during the severe winter season. On a certain road in Maine, which runs north and south, the side porches and most of the windows of the houses and the openings of the connected barns and sheds are almost invariably located on the south—no doubt as protection from the winter wind and cold from the north and as a friendly gesture to the warm sunshine of a short summer.

Climate is also instrumental in the production of character in exterior design. The homes in warm climates are usually quite unlike those in cold climates, not only in planning and exterior massing, but also in general appearance. The people of Scandinavia differ from those of the Mediterranean. The long, cold winters of the north develop a rugged, frugal, and taciturn nation, while the warm sunshine of the south produces a jovial, voluble, and pleasure-loving race. Architecture follows suit. The homes

of the north are likely to be severe, bleak, and formal; those of the south may be gay, exotic, and informal. The prim, sedate Colonial homes of Massachusetts contrast pleasantly with the colorful, sprawling houses of Florida.

Looking at exterior architecture in a more detailed way, we discover that it may be divided into elements according to their use or function. All the various parts which go to make up the interior and exterior shell of a building may be classified as follows:

1. Structural elements:
   walls, columns.
2. Protective elements:
   walls, roofs.
3. Circulatory elements:
   openings, stairs, corridors.
4. Decorative elements:
   cornices, moldings.

At various times in the history of achitecture, climate has affected the development of these elements in the following manner:

Structural elements. In general, walls were thick for structural reasons and in order to counteract the effects of heat and cold. Thickness was the only insulation against undesirable temperatures. Columns were heavy to support the weight of a masonry architecture which received its strength because of the massiveness of its walls. Recent methods of construction have released architecture from the restrictions imposed by the necessity of bearing walls, and there are modern methods of combating the influences of climate without resorting to thick walls.

Protective elements. Walls in contemporary structures are often only space-enclosing elements and as such are even more protective than in earlier examples. However, it may be argued that walls have always been as protective in their function as structural. Their thickness has been a protection from strong winds, storms, and driving rains. A "roof over one's head" seems to offer the most popular type of protection and must receive our major consideration. Roofs in countries with the greatest rainfall and snow loads have been steeply pitched in order to carry the moisture away quickly. They have also been less colorful than those exposed to the brilliant sunshine of the south. The roofs of southern countries with dry climates have been comparatively flat and consequently in character with the horizontal massing of the buildings.

Circulatory elements. In the gray climates of the north large windows were developed in order to catch the maximum amount of sunlight, and stairways were usually inside and thus sheltered from the elements. Door-

ways were protected from rain and storms, and cloisters offered circulation with some degree of physical comfort and protection from the cold. In the south, with its brilliant sun, small windows gave sufficient light and the mildness of the climate encouraged the development of outside stairways. Covered arcades were popular, not as a protection against the cold, but against the heat of the sun.

Decorative elements. The absence of strong sunlight in northern countries has been largely responsible for the development of strong and vigorous moldings. Gothic belt courses and label molds around doorways were deeply undercut in order to create deep shadows. The shallow moldings of the south would be weak and ineffective in subdued light. In a like manner, the crisp decoration of the north would appear harsh and restless in the brilliant sunlight of the south. In much of the architecture of our warmer countries there has been a tendency to concentrate the ornament around openings and to allow it to contrast pleasantly with plain wall surfaces. Color has also been used more freely in the more tropical parts of this country and of Europe.

Chapter 4

THE DEFIANCE OF NATURE

It is interesting to compare the extent to which nature has been defied by man in past and present periods of his history. In the construction of shelter, mankind has always had a struggle with nature, this struggle varying with the technological advancement of the time. The physical environment has always exerted a strong influence in those civilizations not greatly advanced in culture and with scant knowledge of the science of building. Primitive man accepts the unfriendly overtures of nature as inevitable and recognizes his lack of ability to cope with them efficiently. Climate in the past has had a modifying effect upon the development of domestic architecture.

Nature versus Man

However, contemporary civilization has the means with which to overcome many of the effects of unfriendly climate and is able to defy the unwelcomed rain, sun, heat, or cold. Air conditioning eliminates the necessity of placing rooms so that they will receive the benefit of cooling breezes, while the sun may be foiled in many of his attempts to cause discomfort. Walls and roofs are insulated to keep out some of the heat. Glass block windows admit light with less transmission of heat and cold. Large areas of special glass will admit the maximum amount of winter sun, which retains the beneficial ultraviolet rays. Artificial lighting and ventilation are so efficient that windowless buildings are possible and perhaps even desirable except for their psychological effects. Modern construction has rendered flat roofs structurally sound and impervious to rain and snow. Walls are waterproof and no longer need projecting cornices for protection.

However, in spite of these innovations, we still permit traditional forms to influence unduly our domestic architecture. We have become so accustomed to certain types of roofs, walls, openings, and mechanical equipment, which were developed partly through the influence of climate, that

the newer types of non-traditional houses seem to be contrary to sensible practice. But modern science has come to the rescue. Until recently large expanses of glass were too cold for comfort; now double glazing and a more efficient heating system make an open architecture possible and desirable We have thus been encouraged to defy nature by many architectural devices, a few of which may be summarized as follows:

Elements of Climate	Architectural Devices
Wind	Proper orientation to temper winter winds and take advantage of summer breezes. Weather stripping, cross ventilation.
Sun	Shaded porches and windows. Correct orientation with reference to both winter and summer. Large glass areas for winter conditions.
Moisture	Waterproof materials and construction. Proper roof pitch, materials, and flashing, for snow or rain. Sheltered entrances and attached garage. Impervious basement walls.
Temperature	Insulation, double glazing, weatherstripping. Cross ventilation, air conditioning, efficient heating system.

It is possible to secure most of the above results with commonly accepted methods and practices. Whenever any unusual type of plan arrangement, interior treatment, or exterior effect is desired, it should be scrutinized for its relation to climatic influences. Almost anything is possible with modern materials, construction, and mechanical equipment, but it is often a question of how much can or should be attempted by the average home builder.

Today the question which confronts the designer of houses is how far he or she should go in this defiance of nature. What steps are necessary? Are they economically and structurally possible, and are the results worth while after obtained? It is necessary and desirable that we be comfortable, but to what extent should we go in order to secure this condition? Shall we live in a laboratory-like house like experimental biological specimens, or in an open hut exposed to all the vicissitudes of climatic extremes? A compromise between the two seems to be the correct solution.

Chapter 5

THE SOCIAL ENVIRONMENT

People may live in a warm, moist climate or in a climate that is dry or cold. They may dwell in the mountains or on the plains; in the city or on the farm. Their physical environments may vary but their fundamental needs are constant. They must work in order to feed, clothe, and shelter themselves and they must relax from their labors. In doing these things, a culture is developed, which throughout the world has basic institutions and customs but which differs with individual countries according to the influences of climate, topography, and methods of working and playing.

The Changing Social Pattern

Mankind lives in a society which is constantly changing and which must be judged in terms of what has gone before and what is about to come. When nations were isolated by the barriers of mountains and oceans or by the lack of transportation and communication, the changes in their social structure were few and slow. With the development of navigation, the water which had once discouraged intercourse became the means of linking nations together in action and thought. Social systems changed more rapidly because neighboring countries borrowed ideas of manufacturing, commerce, warfare, architecture, art and deportment. Today contacts are instantaneous and the adoption of other peoples' opinions and paraphernalia are scarcely less rapid.

Changes in a social structure are retarded or accelerated by depressions, prosperity, wars, inventions, or radical alterations of governmental forms. The lack of capital may delay the use of new building materials and the development of a new type of architecture. A wealthy nation may have more time for leisure and the sponsoring of the arts. A war may focus all attention on the conflict and away from the problems of housing. A defense program of a nation at war may require most of the available supply of man power, raw materials, and tools for the manufacture of guns, tanks.

and planes, leaving little for those appliances which have to do with housing and the comforts of living. Development in home building may thus be retarded during a war. Or, on the other hand, a government may be forced to try out some new kind of mass housing for those in key defense industries and may thus develop a new technique of building which might have otherwise gone undiscovered for a longer time.

At intervals, science may come forward with a new machine which simplifies our entire mode of living. Progress is slow and uneventful, until an automobile, moving picture, radio, or airplane is given to the world to revolutionize ways of locomotion or entertainment. Modifications are gradual until an omnipotent government decides to tell its citizens where to work, when to play, and how to build. Changes thus take place either by natural or artificial means, by stimulation or repression. This last action may often be more personal than impersonal; it may be dependent upon the attitudes of individuals. When ideas are not acceptable to the majority, they are repressed. If one's conceptions of conduct, dress, furniture, or dwellings do not conform to those of one's associates, they are frowned upon and discouraged. On the other hand, ideas popular with the majority are encouraged. This is often disastrous, for too frequently a degenerate popular taste forms the basis for selections and actions. Fads in dress, furnishings, and buildings may be fantastic, ugly, or insincere but they gain impetus because of the stimulation of misguided approval.

If this social pattern is so important, it is desirable to examine its basic elements. Shelter is an integral part of our culture, and, as such, should express it accurately and consistently. One often hears that changing social and economic conditions have rendered our homes obsolete and that a new architecture is necessary in order to provide a background for our modern manner of living. If this is the case, we should not talk of our social system in vague terms but, instead, we should reduce it to its essentials and find out whether we must discard our old conceptions of houses or merely adjust our method of approach to meet a new environment. Tradition is a convenient peg upon which to hang ideas, but we must not allow tradition to hamper progress in the design of domestic architecture. Houses should reflect the current mode of existence. But what are the characteristics of our present-day society? What are the manifestations of a culture and how do their changes affect the building of homes?

Manifestations of a Culture

A social order is composed of two types of things, the tangibles and the intangibles. The tangibles or material things are represented by food, cloth-

ing, shelter, implements, or arts, those objects and products which have physical qualities. These tangibles may be produced in a slow, laborious way by hand or more rapidly by machinery, and upon their quality depends the character of the culture. Steel tools permit greater precision than iron ones, and this accuracy encourages advances in manufacture and building. The accepted essentials of modern transportation are possible because of the superior quality of factory-made things over those produced by the forges of earlier generations. But the machine cannot reproduce itself. Its inanimateness renders it helpless without the knowledge which develops and improves it. The knowledge which conceives and builds the machine is more important than the machine. And so the intangibles, or the non-material things, are more significant than physical things. Knowledge can create another ship, train, factory, or house, even if all are destroyed. We must have material things but only in order that institutions may exist. Marriage, government, education, religion, work, and play demand material apparatus. It matters not whether these intangibles belong to the past when primitive customs, superstitions, and beliefs governed men's actions or whether they have the more scientific qualities of present attitudes. From these intangibles and the resulting tangibles, clearly defined and commonly accepted factors and influences have developed. These should now be studied in order to arrive at a working basis for the understanding of our contemporary culture.

Chapter 6

THE FUNDAMENTALS OF A CULTURE

If we make even a casual study of our social order, we can easily segregate the most obvious influences which have been responsible for the changes in family life and housing needs during the past few decades. These influences have to do with:

> the settlement of available frontiers, the end of westward expansion; the development of specialized mass production; the concentration of wealth; the uncertainty of employment; the mobility of population, and the effect upon home ownership; the change from direct to indirect distribution of manufactured products through the middle man, resulting in a complex system of which the building public is a confused part; the emphasis upon increased business, and the resulting high-pressure advertising which often sells more clothing, cars, furnishings, and houses than are needed; the diminishing importance of the family as a productive handcraft unit with its release from certain types of drudgery and its dependence upon the specialized skills of others, in the science of home building; the development of a political system based upon individual rights, with the accompanying freedom of planning and home ownership—a system which may be modified by government regimentation; the increased freedom to move from one social and economic class to another, with the resulting changes in standards of living and types of houses; the improvements in the implements and ease of communication and transportation and the accompanying standardization of dress, furnishings, and houses; the changed status of women in industry and business and its effect upon home life and house planning; the changed attitude toward children who were once an economic asset but who now, through enforced education, have become a more definite responsibility, resulting in smaller families and houses; the increased emphasis upon the education of rich and poor alike, with efforts to educate people to buy more attractive furnishings and build more efficient homes; the development of new ideas about mental and physical health, with new attitudes toward working, playing, eating,

and sleeping, and their physical settings in factories, offices, and homes; the growing importance of science in the development of new devices, implements, and shelter; the effects of world-wide wars.

However, it is possible to classify and analyze the foregoing influences in a more basic and fundamental manner. We have already indicated that our social order is composed of tangibles and intangibles, or of

institutions, devices, and practices.

If we develop this thought we find that our cultural pattern may be interpreted according to the following:

1. Institutions—domestic, economic, political, religious, educational.
2. Devices—transportation, communication.
3. Practices—social, artistic, scientific, recuperative.

The Institutions

Domestic Institutions. These are perhaps the most fundamental because they are based upon the idea of marriage and family. They are intimately related to the house because the latter is the scene of family life and the activities associated with it.

In this architectural setting, for all races and social orders, are carried on the basic functions of the family, namely:

1. Establishment of intimacy.
2. Care of children.
3. Strengthening of bonds of family life.
4. Propagation of social customs.

The family exists because of definite biological and emotional needs. While the number of families with children is in the majority, the desire for or care of children is not the most powerful urge in the founding of a family. Instead, the need for intimacy is the paramount consideration. Man establishes a home in both a physical and a spiritual sense—to provide a place for seclusion, for solace, and for the companionship of those who will comfort, encourage, and flatter.

Some of the important factors in family life are related to the size of the unit. Several generations ago families were much larger than they are now and provision had to be made for the accommodation of the greater numbers. Now with the declining birth rate, the average family unit is much smaller, and this movement toward diminution has been accelerated by the shrinking number of dependents. Before the economic freedom of women, unmarried aunts and sisters were added to the normal family unit

but in recent years unattached women usually have their own domestic establishments. Depressions tend to interfere with trends, however. Families double up temporarily to tide over financial emergencies, thus upsetting careful calculations of house planning. Young people ready for marriage find frustration instead of encouragement in their efforts to establish an independent economic unit. Biology must not be denied, so early marriages are subsidized by parents and the young couple is taken in with the older people, thereby completing the cycle of diminishing and increasing sizes of families and dependents. If a family will not be faced with any of the problems arising out of unlooked for additions from the outside, house planning may proceed in its normal manner; but, if there is a possibility that external influences may affect the number for which provision must be made, the consideration must be given to these factors at the beginning of the design process.

Economic Unit. Centuries ago the home was the scene of both the domestic and the economic life of a family. At first things were produced only in quantities large enough for home consumption. Later a surplus was created on account of improvements in methods of manufacture, a surplus which was sold from the dwelling itself or from the attached shop. The next step saw the removal of manufacturing to special centers, or to factories, and the liberation of the home from business, commerce, and industry and its establishment as a place for living.

But even until comparatively recent times, many things have been made at home, either for direct use and consumption or to provide a surplus for disposal elsewhere. Shoes were mended by the cobbler or extra bread was baked by the needy housewife for sale to neighbors. And even today small businesses and professions are conducted from the impromptu office of the home. But on the whole the domestic dwelling has ceased to have as much direct relation to the occupations of the bread winners as it did in earlier days. What work is carried on in the home is largely identified with housework, study, and hobbies.

Education has likewise disappeared as an important family activity. An exception to this is the process of early socialization—or family and group adjustment—which is still carried on in the home. Mass education has become such an integral part of our social structure and our school systems have reached such a high state of mechanical perfection, that there is little need for private instruction. However, more thought is given to provisions for home-study facilities for school children, and this important part of their development need no longer be left to chance. The home should contain definitely assigned places for study.

Social Unit. Modern family life, in many instances, has become a curious mixture of placidity and confusion. Social intercourse is carried on under trying circumstances. Breakfast is hurried, lunch is often entirely eliminated from the home, and dinner provides the only opportunity for the meeting of personalities and the exchange of ideas. And even dinner is sandwiched in between engagements, with the different members of the family dining with one eye on their plates and the other on the clock. Outside interests have weakened family ties, both during the day and the evening. Wives and mothers have become breadwinners, while commercialized entertainment lures young and old alike from the family circle. The radio has counteracted this movement to some extent, but, on the whole, it is easier for some to spend evenings at the movies than it is to remain at home. This is especially true of those whose living quarters have been reduced to a minimum by the demand for efficiency and low costs, as in many apartments and small houses. Rural groups often have more family life because of a slightly higher degree of isolation and less opportunity for escape.

But as long as people are gregarious, certain portions of the house must be designed with this in mind. Even though the younger generation has energy enough to patronize the various forms of commercial entertainment, maturity slows down one's activities and makes the family fireside more attractive for many adults.

The domestic institutions of a culture should, therefore, be scrutinized for current trends and their possible effect on house design. Are there changing attitudes toward marriage, divorce, birth rate, dependents, and home life in general and, if so, what provisions for these changes should be made in the planning of the new dwelling?

Economic Institutions. Changes in the general economic set-up of a nation are likely to have greater influence upon the living habits of a people than any other one thing, for the importance of worldly goods and the ensuing security are fundamental. Out of man's early struggle for existence, it became evident that the surpluses of certain commodities and services could be exchanged. Those who possessed an envied thing or controlled a necessary service found themselves in an advantageous position from which they could influence the activities of others. Their particular ability was recognized and emphasized, and, as a result, division of labor came to be a characteristic of modern economic life. Men specialized and became merchants, craftsmen, or farmers. Progress has been made because man has tried to better his own condition and he has thus far been an adequate and satisfactory guardian of his own interests. From this has de-

veloped the principle of laissez faire, or the spirit of freedom of endeavor and open competition, carrying with it the doctrine of natural rights, the privilege of owning property, and the opportunity for unrestricted buying and selling. Our economic system has been based upon the age-old philosophy of man as an independent individual offering his specialized talents and products for sale in an open market. If abuses grow out of this conception or if our social structure becomes so complex that this practice results in confusion instead of order, then a new type of economic life will be developed. Its effect upon family life and domestic architecture will be emphatic but problematical.

Modern family life and the contemporary house would not be possible without present-day economic life. The differentiation of the producer and consumer, through specialization, has brought about a contradictory situation where man is more independent and at the same time more dependent than were his forefathers. Families now are freed from the necessity of home production, but they are dependent upon outside agencies for their supply of material things. They are no longer economically independent nor are they self-sufficient units. They must depend upon commercial fuels for cooking, heating and lighting, and upon ready-made clothing, running water from a distant pumping station, factory-canned food, and municipal garbage and sewage disposal. There are outside agencies to take care of the maintenance of clothing and furnishings—for laundering, ironing, cleaning. Commercial firms now often do the spring housecleaning and refurbish interiors for urban dwellers. Where man once could raise his own food, weave his own clothes, and build his own house, he now lacks that ability. He must exchange his own special talents for the necessities of life. He is thus part of a complex economic system and is no longer ruler of his own destiny. When contemporary man builds a house, the successful outcome depends not so much on his own skill, intelligence, and planning as on the complicated organization of the building industry.

Paradoxically, while the family has lost its economic independence, it has retained it. If the family can secure a medium of exchange, it can purchase necessities and may be released from the responsibility of producing a diversified group of essentials.

What effect have these changes had upon our culture in general and our domestic architecture in particular? The first part of the question is probably too inclusive to be answered here, but the influence of our modern economic set-up on houses may be analyzed in the following manner.

Work Places. Much of the so-called modern movement in art and architecture has been borrowed from contemporary factories and offices. Effi-

ciency has been the watchword of work places and much attention has been paid to proper lighting, ventilation, and equipment. The reaction against the unhealthy and poorly equipped factories of a few decades ago brought a rush of new materials and methods, and modern industrial and commercial buildings have become streamlined in operation and appearance. These ideas have been repeated in the home, until in some instances the house has become a veritable machine for living. Clean, factory-like interiors with their efficient metal furniture have replaced traditional forms. Building materials now familiar in house construction were first tried out in industry under the most severe conditions.

Occupations. The changing occupations of men and women have had a profound effect upon their living habits and in turn upon domestic architecture. Consider the habits connected with *eating.* People now work a considerable distance from home and, with the crowded hours, have less time for eating. Breakfast must be consumed hurriedly in order to catch the necessary unit of transportation. Lunch now is a sandwich-shop incident in the middle of the day instead of the "cooked meal" of the small-town worker of two generations ago. Medical science has shown that lighter eating is more desirable for the office worker and the manual laborer alike, and people are more conscious of calories and vitamins. Dining today, whether at home or in a restaurant, is often identified with quality rather than quantity. Dining spaces in the modern home are likely to be less matter of fact and static. They are becoming more incidental because of the pressure of both economic and social activities.

The modern attitude toward *leisure* has undergone a definite change due to current economic conditions. Shorter working hours have brought more time for recreation, and many organizations outside the home have developed methods of providing healthful forms of play and entertainment. Playgrounds, ball parks, theaters, and clubs offer activities for participants and spectators. The individual's minutes are planned for him—by his employer and his entertainers. One of the characteristics of contemporary leisure is its regularity. We have amusement by the clock—entertainment and relaxation with definitely assigned periods. Work and play are highly organized—men and women go home to recuperate.

Even *sleeping* habits have been affected by changes in our economic life. The increased pace of business tends to produce nervous exhaustion and there is less sound and relaxed sleeping. Conversely there is greater need for isolated and quiet bedrooms and for comfortable equipment to counteract the effects of our strenuous existence. Some years ago, especially in the smaller towns, there was a more definite similarity between the habits

of urban and rural people. With longer working hours, and with perhaps a little livestock to care for, townfolk were likely to rise as early as farm people. City dwellers were less removed from the farm; their city airs were newly acquired, the habits of their youth were not easily shed. Now the children of our metropolitan centers have to go to the zoo to see a cow, and farm life is a romantic mystery to most city dwellers. People do not necessarily sleep less but their sleeping habits are different from what they were several years ago. Bed is not something to tumble into after a day of exhausting physical labor. Bed is a quiet, comfortable retreat, attractive in appearance and designed to soothe ragged nerves, aided by the music of the radio and the latest products of the mattress manufacturer.

Standards of Living. A standard of living is a variable condition, fluctuating with changing economic and social orders. It is identified by the inclusion of those things which are considered essentials or necessities by a particular group. It is related to family income and suggests, in a discussion of economic institutions, a consideration of the economic or financial status of various groups. Family income may be regular or irregular according to payment and adequate or inadequate according to amount. Its adequacy depends upon the actual wage or salary, number in the family, local price levels, and the ability of the individual to use the income wisely. However, in general, incomes may be:

1. Sub-minimum,
   providing only bare necessities on a sub-standard basis.
   - Problems of existence very acute.
   - Family life negligible.
   - Crowding, malnutrition, lack of privacy, and moral delinquencies characteristic.
   - No shelter worthy of the name.
   - No physical or mental security.
2. Minimum,
   providing necessities and some conveniences.
   - Little time and energy for recreation and self-improvement.
   - Family relations only partially satisfactory.
   - Shelter barely meeting standards of health and decency—inadequate and unsatisfactory.
   - No assurance of lasting security.
3. Adequate,
   providing necessities, conveniences, and comforts.
   - Opportunity for congenial family life, self-expression, and individual development made possible by ample income, secure position, and desirable shelter.

4. Plus-adequate,
providing luxuries beyond mere comforts.
Possibility of philanthropic and civic-improvement activities, in addition to those related to a more complete personal existence.

However, income and the possession of wordly goods alone do not establish a standard of living. Much depends also upon the use which is made of these material things, or a standard of living may be decided in terms of the

1. Quality and quantity of material things:
houses, transportation, food, clothing, schools, industries (tangibles).
2. Use of material things:
conduct, entertaining, eating, dressing, cleanliness (intangibles).

It is a serious but truthful indictment that American standards often place physical comfort ahead of spiritual enjoyment. The superficial material apparatus of a home is considered more important than the less tangible factors which contribute to a complete existence. A house must have the current gadgets, such as tiled kitchens, polychrome lighting fixtures, and picturesque exteriors, while beauty, repose, and honesty in architecture are secondary with many people. Group participation is preferable to privacy; noise to quiet; confusion to orderliness. The material things of a culture are too often not used intelligently. Thus adequate and satisfactory standards of living depend on both the presence and use of physical necessities.

We have become so accustomed to the present standard of living that it is sometimes difficult to remember that the situation was ever different. Even though depressions call for readjustments of requirements, a high degree of convenience and comfort is demanded and expected by the bulk of our population. All except the indigent are surrounded by those devices which make life more pleasant. Many people now have comfortable furniture in adequate, if not efficient or beautiful, houses. They have radios for various brands of entertainment, automobiles for rapid transportation, easier physical work, and shorter hours spent in the factory or office. There is consequently more time for the enjoyment of all these commonly accepted blessings of civilization. During the industrial expansion of the last century, long hours for work were expected from laborers and executives alike. Satisfying the physical requirements of men was more important than catering to their emotional needs. But with the gradual release of mankind from inefficient hand labor by the development of the efficient machine, there has come a realization that individuals are

spiritual and are capable of enjoying moments of leisure. Conscious efforts are now made to raise standards of living and to enable people to live a more complete life. Men who work are encouraged to better their own condition and to become economically independent. Home ownership is advocated as one of the ways of securing a permanent background for pleasant family life. Good planning will contribute to the successful carrying on of fundamental activities. Changes in standards of living will affect house design, either gradually by normal development or as the result of wars, depressions, or prosperity.

Domestic Service. Domestic help is one of the most significant factors affecting the planning of present-day homes. Mechanization of the home has been encouraged and speeded by the lack of servants. When the housewife had to take over most of the work of running a home, she welcomed any mechanical device which made the task easier. Several things have contributed to the gradual disappearance of paid workers in the home. During the nineteenth century immigration furnished a source of supply of untrained women who found their way into domestic service to supplement dependent relatives who earned their keep with the large families of that day. With decreased immigration this source is no longer available. There are also increased opportunities for women to secure other kinds of work, and the home now has to compete with industry and business for the services of women. This has brought about an increase in servants' wages which has been met by other institutions which employ women. As a result there has been a steady decrease in the percentage of servants in relation to the population until today there are only about 50 per cent as many domestics as there were at the beginning of the century. Full-time maids are being replaced by those who work by the hour or who come in for one or two days a week. A day's labor of this latter type may cost as much now as was paid for an entire week's work a generation ago, and, with the high cost of living, housewives are turning to more efficiently planned homes as a solution of the problem. Large houses with spacious halls and many rooms are no longer encouraged. Compactness, good circulation, and proper provisions for cooking and cleaning are necessary to offset the lack of servants.

We may, therefore, ask what other changes are likely to take place in our complex economic structure? Will family life and ties be weakened still further or will interests other than economic hold them together? With less housework, what will be the economic position of the housewife? What influence will the changing status of labor and industry have upon our social and economic life, standards of living of various groups, and

the character of dwellings? What effect will new economic conditions caused by world-wide changes in governments, markets, and treaties have upon the design of houses?

Political Institutions. The political activities are those concerned with the conduct of a government. When people live together, there must be certain laws to insure the promotion of harmonious attitudes and actions and to guarantee justice and fair dealing. Mankind has experienced all kinds of governments and has completed cycles of freedom and oppression. Monarchies, democracies, and totalitarian states have succeeded each other in due order. Individual and political security have been sought and sometimes attained. A good government provides the maximum amount of both physical and spiritual security for the individual. Police protection and fire protection are forms of physical security. With efficient law enforcement certain protective features of a house are disappearing. Shutters, grilles, and heavy doors and walls are no longer necessary, and, if they are retained, it is largely for the sake of effect and decoration. Men build with a feeling of safety because of the supply of fireproof materials and the adequacy of fire-fighting apparatus. Freedom of thought and action promotes a feeling of spiritual security. Pride in home ownership is encouraged by a liberal and intelligent government.

In the field of government the forces of democracy and individual effort are currently engaged in a struggle with those of totalitarianism and regimentation. Our civilization is becoming so complex that some kind of a planned existence, either in part or in whole, is offered as a solution of many of our economic and social evils. If this movement becomes pronounced, the changes in our culture will be more rapid than otherwise and our domestic architecture will reflect this new order. People will be told what occupations they should choose, what hours they may work, how large their families should be, what type of supervised recreation they should indulge in, and what kind of houses they may build. A powerful government can insist upon experiments with the materials and theories of housing which it would take private initiative many years to summon courage enough to try. A government can require people to live according to a certain manner in an architecture of its choosing. Governments can institute such practices as social security, old-age pensions, and unemployment insurance which will affect ways of living. Families may not have to provide for indigent elderly relatives and may thus require smaller homes and also be able to divert funds from the maintenance of the old to the construction of houses. The political set-up of a country may thus have a direct influence upon the dwellings of its people.

Religious Institutions. Religion requires churches of various forms to care for the worship of devout people, but it has had little effect upon the design of homes. It is true that the castles, palaces, and manor houses of old made provisions for chapels and that the modest homes of all periods have displayed religious symbols; but, on the whole, aside from daily devotions, religious activities are carried on in ecclesiastical buildings. In recent years, cults have partially replaced, or at least accompanied, religion. We have long been worshippers of the past. We feel secure with familiar associations and things. Old furniture, old houses, and old and established ways of living require no changes or readjustments. Human inertia encourages stability, and stability becomes a spiritual, if not a religious, quality.

While clinging to the old, people reach out for current fads and innovations. Modern high-pressure advertising and salesmanship help to create a mob hysteria for new styles in clothes, furnishings, and houses. Too often this hysteria is based upon a public taste devoid of ability to choose between that which is efficient and beautiful and that which is spectacular and shoddy. Cheap furnuiture is made in enormous quantities and released throughout the country to a gullible public; gaudy bungalows catch popular fancy and mar our suburbs. If the cult of functional beauty were half as aggressive as that of superficial picturesqueness, our homes, both inside and out, would be much more pleasing.

Educational Institutions. Mass education distinguishes our culture from those cultures which have preceded it. Learning once belonged to a few scholars in the clergy and laity. Only in the last few centuries has any effort been made to educate the average person. But now the idea of popular education has become a fetish. People cannot escape the rudiments of learning, for they are compelled by law to attend school. A depression makes it more difficult for young people to obtain employment and encourages a still longer period of time in the schoolroom. High wages do not lure them away from their books. These factors affect home life and in turn the planning of houses as the scene of study activities.

As a larger percentage of the population receives a formal education, education itself becomes less valuable. The common-school training which was sufficient a few generations ago is now regarded as only an elementary stage, while the college degree, once restricted to a few, has become the ambition of the many. By raising standards, a greater number of people are forced to spend longer periods attending school and, theoretically, are better equipped to understand the problems of living and to enjoy the benefits of our culture. With ample education, mankind should be qualified to judge and plan human habitations.

Architecture in general feels the effect of man's more eager quest for information and knowledge. Buildings must be erected to serve as museums, libraries, and newspaper plants, for these contribute to his education. People are attending lectures and exhibits in ever-increasing numbers and bringing to the home new ideas about planning and decoration. The principles of modern art and architecture are taught by many institutions which are easily within the reach of city dwellers, and assist in improving the standards of contemporary housing.

The Devices

The Devices of Transportation. The changes in methods of transportation have been responsible for many of the innovations in our ways of working and modes of living. Transportation has made its greatest strides within the last century. Previously, the oxcart, the stagecoach, and the sailing vessel were the means by which man could move himself and his material goods from place to place. Then came the steam engine in trains and boats and more recently the automobile, electric street car, and airplane. The emphasis is upon speed and comfort; rapid and pleasant transportation is taken for granted. All this has had a profound effect upon habits of living and upon the architecture of our country. Easy transportation takes individuals away from home with minimum effort. It encourages numerous engagements during the course of a day and often causes nervous exhaustion. People work farther from their homes and spend less time there and more time commuting from greater distances. This is counterbalanced to some extent by increased speed of transportation and by shorter working hours. The extra leisure time is often given over to some kind of supervised or commercialized recreation. The efficiency of the rapid-transit system or the automobile enables people to play until the last minute and then dash home just in time for the evening meal.

Ease of transportation encourages travel both at home and abroad. Ideas about home building and design spread quickly because people can visit various parts of the country and see new movements in architecture. Sometimes architectural details and treatments are transplanted from one locality to another and lose their significance and worth because of different climatic conditions. The easy diffusion of ideas sometimes tends to discourage the development of architecture truly expressive of local customs and physical environments.

Building materials have become less local in their use with the development of efficient methods of transportation. The marble, wood, slate, or brick of far-off places can be brought to our very doors, and architecture

has been enriched by man's ability to conquer distances. Foodstuffs are almost as international in character. The delicacies of foreign countries become commonly accepted domestic dishes. The produce of southern truck farms reach northern dinner tables in a few hours' time. The housewife no longer has to plan meals far ahead, and large kitchens and storage spaces are unnecessary. Rapid transportation brings fresh, canned, and frozen foods from a nearby market in a few minutes' time, and home canning is no longer necessary for the city woman. However, because of the proximity of produce, the rural woman often finds it economical to do home canning, and this calls for a kitchen larger than is necessary in the city home.

Modern transportation has also had much influence upon the appearance of things associated with daily living and the home. Present-day conveyance units have undergone greater changes than has the house. They have ceased to be awkward and inefficient. They are dynamic and are expressive of the movement for which they were built. They are streamlined and graceful, efficiently symbolic of man's release from creeping on the earth and of his conquest of time and space. This has been reflected in the design of furniture and accessories with which we live and even in the houses themselves. The materials and the outward appearance of modern transportation units and their accessories have been incorporated into certain houses of the contemporary period. Factory-built, prefabricated units, similar to those associated with automobile production, are replacing those constructed by hand labor at the building site. The windows, hardware, metals, and furniture of modern airliners are finding an expression in our machine-like houses. Sponge-rubber or latex cushions were first tried out as seats for busses and private cars and then in the davenports, chairs, and beds of our homes.

One must not lose sight of the fact, however, that the automobile is intended for movement and speed and that the house, as yet, is stationary. The car is mobile; the house is immobile. The car is built to last for five years and provides only enough room in which to sit. The house is built to last for fifty years and must provide space for all the activities connected with living. A car is reduced to its essentials. The home may need to be something more than just a machine. The car is impersonal; some may want the home to be more personal.

The life of our nation is, to a great extent, built around the methods of transportation. The increased use of automobile, truck, bus, and street car has produced the traffic problems of speed, congestion, and noise. Noise is especially significant in determining the location and design of homes. In

the horse-and-buggy days, the fine Victorian homes were built along the broad streets and avenues. These were the most beautiful and desirable locations, and the rhythmic clop-clop of the horses' hoofs was a pleasant accompaniment to the living of that day. Now these same streets are the arterial highways leading to the center of the city and are filled at all hours with the roar of automobiles and busses. Homes on the side streets away from the noise of modern transportation are more desirable. But even on the minor thoroughfares there is enough traffic to affect the location of our major living units. In the old days, the front porch was a desirable feature. Traffic was quiet, slow, and deliberate, and much of it was pedestrian. Neighbors on the way to the corner store stopped for a chat over the front gate or rested on the porch on the way back home. It was a friendly age. Now neighbors, often unknown even by name, rush by in cars bound for work many miles away. There is no time for friendly conversation. The speed and the noise of passing traffic have made the front porch undesirable. The porch has moved to the side of the house and, finding itself too close to the neighbor's kitchen door, is continuing its way toward the rear. Privacy has become a desirable quality, and living rooms and terraces are now facing secluded gardens screened from the street. Kitchens, service units, and stairs occupy much of the front of the house. The impersonal areas screen the more personal ones from a street which is no longer interested in one's private activities except in a curious manner.

The automobile has replaced the living room to some extent during the summer months as the scene of a phase of social life. Nowadays when people wish to visit they go for a ride in the country, combining gossip, recreation, and travel. This is especially true of those who live in small apartments or houses, or of those who wish to escape the conflicting interests of large families. The mobile house or automobile trailer also takes people away from home—in this case, for weeks or months. Social intercourse is thus transformed into recreation of a protracted type.

Modern life in the city or on the farm is thus so closely related to transportation that any changes in our ways of moving from place to place are bound to affect our family relations and our homes. We may well ask what improvements are being made in the automobile, airplane, or train and what influence will they have on domestic architecture.

THE DEVICES OF COMMUNICATION. The development of communication has been just as spectacular as that of transportation. Radio and television of today are quite unlike the smoke signals of primitive man. The written and illustrated news of an air raid in a foreign capital is printed and on our city streets within a few minutes after the event takes place. By means

of the telephone, we may converse with a friend thousands of miles away. Radios, magazines, and newspapers have invaded the home and have brought with them new forms of passive relaxation. It has been said that we are becoming mentally lazy. Our newspapers are in tabloid form so that they may be read at a glance, and, if that is too much effort, the radio will bring predigested news reports. This mental laziness is reflected in our furnishings. There was a time when conversation was an art. It was not casual but was directed and pointed. It required alertness. The straighter chairs of those days encouraged concise thinking and quick repartee. Lounging was not desirable or fashionable, partly, it is true, because the dress of those days was not so simple as that of today and mussed more easily. Now we sink back into the low upholstered modern chairs and relax completely, sometimes both physically and mentally. Living rooms must be designed with this changed emphasis in mind.

As in the case of transportation, communication has helped to educate people in the ways of other communities. Illustrated magazines bring the latest photographs of modern and traditional houses, and the home builders of Maine can copy the efforts of those of California almost before the paint is dry on the walls. This educational force can be either a liability or an asset. It can retard or speed progress. If the sentiment of the English cottage is emphasized, traditional forms may persist after they are outmoded. If the simplification of the contemporary movement is encouraged, a better shelter for living may develop. Printed words and illustrations guide much of our architectural thinking.

The telephone is one of the most conspicuous instruments of communication. It used to hang on the dining-room wall and was as ugly as the house in which it was found. When sister's beau called up, the ensuing conversation was as private as the life of the proverbial fish in the aquarium. Now the telephone has become more efficient and more pleasing in appearance and is often placed in a room devoted to its use. We may arrange social events quickly and thus may have our living room filled with guests in a few minutes' time. Our domestic architecture must be keyed up to the speed which modern communication imposes upon our culture.

With these influences in mind, we may study present-day trends and ask what changes are taking place in our methods of communication and what effect these will have on the design of our homes.

The Practices

Artistic Practices. Ever since primitive man scratched designs of prehistoric animals on the walls of his cave or decorated his utensils and

weapons, there has been a search after the current interpretations of beauty. This conception of beauty has varied with the period and the country, but it has persisted because of the need of people for spiritual and aesthetic pleasure. It has been influenced by the economic and social order in existence during a particular period. At times there has been a capitalistic and paternal control of the fine arts, with painting and sculpture belonging to the nobility or the wealthy. In many cases the applied arts of yesterday have become the fine arts of today. When Greek vases were first created, they were primarily utilitarian. Now they are displayed in museums for their beauty of form and decoration. Our current culture places emphasis upon art in industry, or the application of art to the material things of our existence. It has been found that a canned food, equal in quality to another, has a better sales appeal if it is packed in a more attractive container. It is equally true that a good-looking range harmonizes better with a streamlined kitchen than does one with awkward proportions. Efficiency in our every-day appliances is taken for granted; beauty often becomes the deciding factor. Even our fine arts are becoming more functional. A painting is created as decoration for a definite place in the home while sculpture serves as a utilitarian necessary accent upon the exterior of a building.

As a result, people are more art-conscious than at any time in recent history. They are trying to learn about the creative principles upon which good art is based and they are leaning less upon tradition. The romantic attitude toward beauty and art is being abandoned for one which encourages more of the abstract and conventional. The various movements in modern painting have had a profound effect upon domestic architecture, especially in the matter of exterior design. The angular forms of cubism and the lack of realism in surrealism are reflected in the plain surfaces and geometrical areas of the contemporary architectural style. There should be a uniformity of treatment when architecture, furniture, fabrics, paintings, and sculpture are combined. An entire composition in arrangement, color, and character may be built around a still-life study. A painting by Gauguin calls for an appropriate setting.

We cannot leave the subject of art without asking the dangerous and difficult question, "What determines the source and character of beauty?" The controversy now seems to be between sterility and confusion. At one extreme is that movement which has been called "stripped architecture." One recent important building was described as having "the stark simplicity of a cigar box." At the other extreme are some of our traditional examples overloaded with useless and meaningless ornament. On one hand, architecture and the building of homes become a science from which

art is largely divorced. On the other, architecture is too much of an "art" and not enough of a science. It would seem that a successful solution calls for a compromise. There is not enough beauty in bleak rectangular forms to satisfy any except the few. If simplicity had been the only necessary attribute of art, we should not have had the cathedrals and the stained glass of the Middle Ages, or the Georgian houses of Colonial days. Restrained decoration is a necessity for complete enjoyment. If all frivolity were eliminated, our lives would become drab and dull.

Scientific Practices. Science has developed from the philosophy of antiquity, which dealt with working of natural forces, to the exact studies and laws of contemporary times. Many centuries ago science concerned itself chiefly with the wind, sun, and stars, and with man's blood stream and his digestive apparatus, and was not far removed from black magic. It knew little of the presence or power of electricity, steam, atoms, hormones, vitamins, or the many other contributions of chemistry and physics. Today science is reshaping the world. This is the age of research in industry, and new products and methods of manufacturing are being developed faster than they can be assimilated. Science is responsible for countless improvements in transportation, communication, and methods and materials of building. New synthetic products appear before the old ones can even be described, and new names must be coined for things which were absolutely unheard of before they were developed. The modern laboratory can create almost anything and it is not restricted in its source of supply. Almost anything can be made into anything. Our houses of the future are now being planned in the laboratories of science. The homes of tomorrow are in the test tubes of today.

The farmer is no longer interested only in raising food for the nation. His land has become the source of raw materials for industry. Soybeans, potatoes, and sugar cane have been drafted to make toothbrush handles, radio cabinets, chairs, and even the walls for our homes. The cow herself has to donate milk for casein to be used in the manufacture of plastics—new materials which are light, strong, durable, beautiful, and often better than the wood or metal which they replace.

Modern science has presented us with the mechanical equipment of our homes. All the recent improvements in lighting, heating, ventilating, and sanitation owe their existence to the collaboration of science and industry. These two forces working together make it possible for the home to become a "machine for living," and it is in this direction that the greatest changes in house planning are likely to come. One can visualize the home of the future as something quite unlike that of today. This architectural

treatment, which is now called "modernism," is likely to be as traditional and outmoded as any of the historical styles. Corner windows and flat roofs do not make functional architecture or guarantee an efficient, mechanized existence. The house of tomorrow may be extremely simple in comparison with the complex structure of today. Plastic walls may be poured into place by a single operation, with transparent, translucent, and opaque areas providing the necessary space-enclosing surfaces. Physics may contribute rays of energy, light, and heat to take the place of our elaborate mechanical systems. The architect and the house designer of the future may have an entirely different vocabulary from the cumbersome one which is now at their command.

Social Practices. Man is, by nature, a gregarious animal and as such seeks the company of his fellow creatures. He invites his friends to his home and builds his house with this need in mind. His living room must provide for this personal type of social intercourse, while outside agencies offer the more public kind of opportunity for individuals to assemble for group participation. The social activities of yesterday were extremely simple in comparison with those of today. Then poor roads and the absence of rapid transportation limited the scene of social events. Movies and night clubs belonged to a future generation. People met their friends and received their entertainment at church socials and home parties. Today new methods of meeting with fellow individuals have been developed. There are luncheon, city, and country clubs. There are card parties, teas, receptions. There are gatherings in the home, parish house, lodge room, or hotel ballroom. Houses must be designed with the realization that the scene of social activities is constantly shifting. The size, shape, and character of living and recreation areas in the home should reflect the current and, if possible, the future trends in man's gregarious needs.

Recuperative Practices. Our activities may be looked upon as being concerned solely with the process of expending and recuperating energy. We work in the office, factory, or on the farm at our chosen occupation and then we work at play in an effort to forget that which we call "work." We should have definite periods of recuperation during which time we can actually rest, both mentally and physically. Much of our home life is supposed to provide this necessary relaxation, and the proper facilities should be included for quiet periods of reading, music, and conversation, and for undisturbed sleep. Hobbies offer an outlet and a change—physical activities for the sedentary, or less vigorous activities for the athletic. If a home becomes too compact by being reduced to its essentials, there is no

place for this mental recuperative process. While homes are better equipped than ever before to care for the sick, there is less need than in previous years. Efficient and adequate hospitals, socialized medicine, and clinics have taken much of our serious illness out of the home, while even minor ailments are cared for by commercial or governmental institutions.

These foregoing aspects of our culture represent the majority of our activities and are those which must be studied if we attempt to predict the future of housing for the masses or the design of homes for individuals. Dwellings will change in function and appearance only as family life changes, and it will develop in the direction taken by our social and economic order. A successful designer of homes should, therefore, be something of a sociologist, an economist, an engineer, a business man, and an artist. If he is to design houses expressive of the current social system, he should be familiar with the ever-changing institutions and customs which constitute the world in which he lives.

Chapter 7

INTERPRETATIONS OF SHELTER

Representative Periods

In striving for security and comfort through the ages, man has interpreted his housing needs in various ways. The different types of shelter representative of various social orders have been composed of the fundamental elements, such as walls, roofs, doors, and windows, but have varied with the civilization of the time and the climate by which they were conditioned. An examination of some of the representative examples reveals the following characteristics:

Classical Antiquity. The houses of Greek and Roman cities were built around atriums or courtyards. They were often one story in height and consisted of simple rectangular masses with plain, unadorned stucco walls facing the street. The first series of rooms abutting the street was given over to shops leased for business purposes, while behind these were various family rooms. They were reception rooms, dining room, men's bedrooms, and women's bedrooms. Family life centered around the inner courtyard far removed from the activity of the street, as the result of man's desire for privacy. The interiors of these houses were often decorated with brilliantly colored frescoes and they were adorned with works of sculpture.

The Middle Ages. In western Europe the dwelling lost much of its importance during the building of the great cathedrals. The Church demanded the attention of stone masons and wood carvers and their efforts were directed toward the production of ecclesiastical architecture. The common people of that day lived as serfs under the feudal system and, as a result of this social order, the castle of the ruling baron was the only domestic structure which received any consideration along with the building of churches. However, the castles, and the manor houses which followed, were the forerunners of later dwellings, and we may well inquire into their character and arrangement. The castle was a fortified home.

generally four stories high, built with thick stone walls, and surrounded by a moat. The "keep" or main building consisted primarily of the great hall, which formed the living quarters of the baron, his family, and his retainers. This was the scene of feasting and singing, with the baron and his family at table on a dais at the end of the room. When the feast was over the floor of the hall provided a sleeping place for the retainers. Life was primitive and lusty.

The castle was vertical in the direction of its massing, and the manor house which followed was horizontal. Civil strife diminished, and there was less need for fortification. The dissolution of the monasteries resulted in less ecclesiastical architecture, and more attention was given to the building of dwellings. The hall still retained its importance, but with the desire for privacy came the development of numerous withdrawing rooms, galleries, and bedrooms. Windows became larger, and glazing them encouraged a more comfortable existence. The interior walls were plastered or paneled and hung with rich tapestries. At first the plans of these manor houses were informal and reflected the spirit of mediaevalism.

The Renaissance. With the coming of the Renaissance, a more symmetrical type of planning came into existence. Smaller houses began to receive attention until finally the Georgian house, which was the forerunner of our Colonial, was developed. Brick and stone architecture, with the details of the Italian Renaissance, which in turn were borrowed from the Classical Period, reflected the growth of English cities, commerce, and trade. The feudal system with lords and serfs disappeared, and the spirit of individual endeavor with division of labor came into existence.

American Houses. The story of the development of architecture in America is familiar to all of us. We recall how the Colonists brought the characteristics of mediaeval architecture to this country for our Early American houses and of the Georgian for our interpretations in wood for New England and in brick for Virginia. We are familiar with the Classical revival of the early half of the nineteenth century and with the Victorian movement of the latter half. At the beginning of the present century we borrowed freely from all the traditional styles of architecture, modifying them somewhat to suit our ways of living. Even the present wave of modernism which has become conspicuous during the second quarter of this century was not indigenous but was borrowed here and there from the pioneering efforts of designers who were tired of old forms. Encouragement to this movement has been given impetus by the influence of the machine age in which we are living. But, as in the past and in spite of our

borrowings, we shall probably always impart a national flavor to our domestic architecture.

And thus architecture has grown, and will continue to grow, from its physical and social environment.

STUDY EXERCISES

1. Investigate the influence of climate on the houses of these parts of the United States: New England, Middle West, South, Southwest, Mountain States.

2. Make a list of the ways by which climate has affected the development of: walls, roofs, doors, windows, chimneys, porches, and decoration during the various historical periods.

3. List various methods of building houses to counteract the unfriendly effect of nature—sun, wind, rain, snow, and temperature.

4. Select a definite location with reference to geography, climate, and topography and develop a typical house to suit the physical setting.

5. List recent changes in our contemporary domestic institutions and their effect on house design.

6. What probable changes in our family life are imminent and how will they influence domestic architecture?

7. What changes in our economic system have most influenced house design in America during the following periods: Early American, Colonial, nineteenth century, twentieth century?

8. Discuss the effect which modern transportation, commerce, and government have had on modern art, furnishings, and domestic architecture.

9. List the more important recent contributions of science to home architecture.

10. What influence did the First World War have on the economic and social life of the United States? How did these changes affect family life and domestic architecture?

11. What probable effect will the Second World War, with tendencies toward regimentation, planned economy, and socialization, have on our ways of living and the houses we build?

12. Select five definite families and analyze and evaluate their standards of living. Are their standards of living reflected in their homes? How?

13. List recent changes in our political or governmental institutions and their influence on housing.

14. Analyze your neighborhood or community for its interest in things artistic, such as music, painting, sculpture, architecture, drama, and literature.

15. Make sketches of floor plans of houses of the various historical periods mentioned in Chapter 7.

PART THREE

PLANNING FOR FAMILY SHELTER

Chapter 8

ACTIVITIES IN THE HOME

The physical-social environment in which man exists conditions his many daily activities and the house in which he lives. However, no matter where he may be or what he is doing, there are only two phases to these activities. They may be identified as

occupation
recuperation

Man works largely through necessity but partly through choice. He engages in some sort of an occupation, as "doctor, lawyer, merchant, chief," for several hours during the day. The rest of the time he recuperates from the exacting pressure of modern life and this recuperation may be

physical
mental
spiritual

After a day's work in the office, factory, or field, man comes home for physical rest and mental relaxation. By eating, sleeping, conversing, and playing, he refreshes his mind and body, and by hearing good music and reading good books he enriches his spiritual life. The majority of man's recuperative activities are carried on within the home. His worship takes place mostly in the church; his recreation frequently in clubs, theaters, or playgrounds.

If we cease discussing man in a general and perhaps a masculine sense and talk about the other sex, the housewife, we find that the home is the scene of both the occupational and the recuperative activities. Housework may be quite dull and unpleasant unless the physical setting is appropriately planned and unless the correct mental attitude is fostered by a cheerful environment. It is our duty to plan houses which will be pleasant places in which the housewife may work and which will also serve as an escape from the daily occupation. Houses should be efficient machines for

living and, in addition, places for mental and spiritual relaxation for all members of the family.

The activities which are carried on within the home by men, women, and children are fundamental to mankind. They are basically the same as those characteristic of primitive man. It is only in the methods of performing the various acts identified with our daily existence that we differ from those whom we consider less civilized. We place a different emphasis on the details of our activities—perhaps a regard for manners in eating, comfort in relaxing, privacy in sleeping, which did not exist with primitive people. But the change has been a slow one during the centuries and it has been recorded in the homes which have been built.

It is these changes in our activities and the changes which are to come which should influence the design and construction of our homes. The houses of the past have developed as the result of the current social order, and the houses of the present are gradually feeling the impact of our manner of living. The influences of style and tradition are being minimized, and an architecture expressive of our modern age is maturing. In order to speed this movement let us keep in mind that house plans should always be organized around the interests and activities of the occupants and that there should be no attempts to force family life into an outmoded or too highly standardized pattern.

The Activities

The various activities which are related to the home and which should be the controlling factors in house design may be summarized as follows:

Those concerned with *Recreation.*
Those concerned with *Food,*
  its preparation and consumption.
Those concerned with *Sleep.*
Those concerned with *Sanitation.*
Those concerned with *Work*:
  work growing from household activities.
  work brought in from the outside.

Chapter 9

ANALYZING THE REQUIREMENTS

The manner in which a family carries on its daily activities should determine the kind of house best suited to its needs. Dwellings are built for the purpose of providing space for individuals while they eat, sleep, and rest; any attempts at architectural design should therefore be preceded by a study of how people live. However, an understanding of man's physical and social environment will not alone produce domestic architecture. Sociology and geography do not build houses—they merely condition them. Any study of past and current cultures should be made only as an approach to the problems of designing a home.

Architecture, whether domestic, industrial, or ecclesiastical, begins with planning. The designer of a house, factory, or church assembles areas and spaces in such a way that they will function adequately and will produce pleasing interiors and exteriors. He uses the elements of plan composition known as rooms which are produced by walls, windows, doors, floors, and ceilings. He groups them together into combinations, which vary to meet the demands of climate and topography and the needs of the occupants. Just as a novelist expresses ideas with words or an artist catches the spirit of a landscape with paint, so does an architect compose the elements of a house to produce a basic necessity for man, *shelter.*

An Expressive Plan. Too often in recent years the plans of houses have not been adapted to the interests of families. Houses have been built from patterns which conformed to established arrangements based on tradition, popular taste, resale devices, and stereotyped plan layouts. Families have had to adjust their ways of living to English, Colonial, or Spanish houses, with their typical, inflexible arrangements. Progress in house design has been resultingly slow. The design of a dwelling should be approached with a different point of view. Houses should develop as the logical outgrowth of an effort to shelter man's activities efficiently and pleasantly.

An Analysis of Family Needs

Mankind, primitive or contemporary, is the resultant of environmental modifications of hereditary tendencies. Environment and heredity together produce individuals with varying types of physical and mental equipment. In spite of these variations, it is evident that the basic needs of man—whether he lives in cave, cabin, or castle—are similar. All people must have food, clothing, and shelter. It is only in the attitude toward, the manner of doing, and the material apparatus for performing fundamental activities that individuals differ. In general, these differences which exist between groups of people are related to their financial status—to the types of shelter and equipment which can be provided, either by adequate or inadequate incomes. (See page 30.) Those in the low-income brackets cannot, unaided, live decently and secure satisfactory shelter. Poverty causes a more intense struggle for existence, with less leisure time and less opportunity for congenial family life. Overcrowding, due to improper housing, usually means less privacy, more illness, and greater moral delinquency. However, fundamentally, planning homes for these people is no different from planning for any other group, except as their economic limitations affect their ability to buy or rent and to adjust their personal attitudes to improved shelter. These problems require special study, and a brief discussion of them will be found in Chapter 13.

As the family income rises, a surplus of time, money, and energy (see page 5) is created, and many of the social and economic problems peculiar to those with low incomes are eliminated or subordinated. Individuals, partially freed from certain limitations, find that their financial status will permit the erection of detached, private dwellings, and it is to those in this group that the major portion of the following discussion is directed. One of the distinguishing characteristics of a family is the occupation of the wage earner. This daily work and its relation to income affect planning and make each house an individual problem. While all families must eat and sleep, they do not have the same requirements. It is true that they need kitchens, dining rooms, and bedrooms, but they often have divergent ideas about the character of these areas. There may be other rooms which they would like to add to these, which are considered the essentials.

Occupation. Consider, for instance, the interests of the family of a lawyer, grocer, sales-manager, physician, professional golfer, research director, author, artist, photographer, carpenter, minister, music teacher, machinist, taxicab driver, social leader, or farmer.

They have very different ideas about the importance and method of dining, entertaining, reading, studying, or playing. Some may need large dining and living rooms; others may want libraries or offices, as

A study, library, or office for a
lawyer, research director, author, physician, or farmer.
A recreation space for a
sales-manager, golfer, social leader.
A music space for a
music teacher, social leader, minister.
A hobby room or studio for a
photographer, artist, physician.
A large secondary work space for
the farmer's wife

and perhaps none of these for the family of the grocer, machinist, or taxicab driver. So, first of all, the occupation of the husband and father has much to do with the interests of the entire family as they are related to his activities and with the planning of the house as the shelter for the performance of daily tasks.

Size. A physical characteristic of a family, even more conspicuous than occupation, is size. Size varies chiefly with the lack or presence of children and with their number. Families may be grouped as follows:

1. Those without children:
   a. Both husband and wife working; often living in a small apartment.
   b. Wife not working; enough interest in homemaking and community life to live in a house or an adequate apartment.
2. Those with children:
   a. Wife working, or with many interests outside the home, whether house or apartment; housework and care of children delegated to cook, maid, or relative.
   b. Wife managing the home and family activities; doing most of work.
3. Those with adult dependents:
   a. Dependents capable of helping with or assuming responsibility for housework.
   b. Dependents requiring care and attention.

The designers of houses must, therefore, plan for families with or without children, varying in number from two to several, or an average of about four, or for families with dependents. The needs of the above groups vary with their respective physical settings and personal attitudes and may be analyzed in several different ways.

Changes. Those who plan houses often make the mistake of assuming that the requirements are static. Only the necessities of life remain fixed—all else is constant change. Briefly, consider the changes in:

1. Activities:
   a. The changing activities of a growing family.
   b. The changed manner of living when moving from a minimum to an adequate house, or reverse.
2. Interests:
   a. Changes in size of family and effect on space requirements.
   b. Changes produced by completion of family cycle, or birth, growth, and departure of children.
   c. Changes in economic and social standards of a family; their effect upon the quality of housing.
   d. The changing ability of families to analyze their needs, as they become aware of defects in living and attempt to remedy them.
   e. The improvement in taste in exterior and interior design and furnishings through contacts and education.
3. Culture:
   The changes in social and economic conditions beyond the control of the individual or family, and their influence on home life and domestic architecture.

Compromises. It is a simple matter to list the various physical aspects of a family and it would seem that it would be comparatively easy to develop a house plan to care for the daily functions of a group of individuals. Architecture, however, is a series of compromises, and the designing of a home is no exception. The average home builder cannot have everything he desires. Usually financial restrictions call for curtailments in the size and quality of a house and in the type of furnishings. These compromises may be enumerated as follows:

1. Compromise between desires and actual needs.
2. Compromise between actual needs and financial restrictions.
3. Compromise between actual needs and resulting space restrictions.
4. Compromise between conflicting family interests and space restrictions.
5. Final compromise, resulting in the plan for a house.

Family Statistics. It is obvious that, before any serious attempts at planning can be made, it is necessary to find out all that is possible about the family which is to occupy the house. In addition to the purely physical characteristics, a study of the less tangible and more personal aspects of family life should be conducted. Occupation, size, and financial status are

important, but attitudes toward domestic routines should have equal influence on domestic architecture.

A GUIDE FOR PLANNING

Occupation of husband _____ Influence on home activities _____

Number in family _____ Children _____ Sex _____ Ages

_____ Yearly income _____ Sum available for building _____

Servants _____ Full time _____ Part time _____

Miscellaneous help _____

Family Characteristics

Recreation. What are the chief recreational interests of the family? _____ Reading? _____ Own many books? _____ Conversation? _____ Music? _____ Bridge? _____ Dancing? _____ What active games? _____ Table tennis? _____ Billiards? _____ Many guests? _____ Formal? _____ Informal? _____

Cooking. How many work in kitchen? _____ Size of kitchen desired _____ Servant or housewife _____ Do children play in kitchen? _____ What is preference, small laboratory-like _____ or large, informal personal type? _____ _____ Location on front _____ rear _____? Equipment desired _____ Ideas about finish and color _____

Dining. Are there many formal meals? _____ If casual meals, are they hasty or leisurely? _____ Is family home for lunch? _____ Is there much entertaining? _____ Formal? _____ Informal? _____ Does the family remain at the table after meals for conversation? _____ Do they listen to

the radio? _____ Is dining nook in kitchen or in separate location desired? _____ Is a formal dining room required? _____ What is the attitude toward combined dining and living room? _____ Is there a desire for outdoor dining and what facilities are required? _____

Hobbies and homework. What are the hobbies of the individual members? _____ What homework or study? _____ Is there a need for a study, office, hobby room, or workroom? _____ Location? _____ Size? _____ Equipment? _____

Sleeping. How many bedrooms are needed? _____ Twin beds? _____ Double bed? _____ Are bedrooms for general use? _____ For sleeping only? _____ For study? _____ Reading? _____ Writing? _____ Is a radio desired? _____ List personal idiosyncrasies of members of family _____ Are they sensitive to light? _____ Sound? _____ Wind? _____ What special equipment or furniture is desired? _____

Sanitation. Number of bathrooms desired _____ Equipment _____ Is bathing hurried _____ or a ritual? _____ List personal needs and interests _____ Is laundry done at home or sent out? _____ What is reaction about location of laundry and equipment needed? _____

Storage. What are the storage needs of the family? _____ Desire for elaborate or simple provisions? _____ Large or small supply of clothing? _____ Household linen _____, cleaning supplies _____, garden equipment _____, trunks, bags, and bulky things? _____

Transportation. How many cars? _____ Used for pleasure _____

business _____ or shopping? _____ Location of garage? Near kitchen entrance _____, front entrance _____, attached _____, detached _____, in basement? _____

Resulting Personalities. From a study of the foregoing needs of a family, it is possible to form a definite list of the various requirements which must be satisfied in the building of a home. Before detailed items are studied, however, it is desirable to secure a picture of the general character of the family and establish a personality for the house which will be compatible with that of the occupants. Is the family sturdy, unimaginative, even phlegmatic; or is it volatile, sensitive, even brilliant? Is it dynamic, energetic, exuberant; or quiet, sedate, and reserved? Can it best be represented by English roast beef in a heavy oak dining room or by French canapés in a dainty Louis XVI setting? The house of a dynamic family may be developed around an open plan for freedom of movement, incorporating plain simple construction and substantial furnishings to withstand dancing, home dramatics, and a boisterous mode of living. It should be a house easy of maintenance so that there will be the minimum of conflict between family activities and housekeeping routines.

A house for a quiet family may have some of these same qualities but the atmosphere may be entirely different. Privacy and seclusion may be stressed, and a desire on the part of the family to surround itself with old books, old glass, old prints, and old friends may be an outstanding characteristic. In brief, families usually have very definite personalities and the house should be as complete an expression of that particular personality as it is possible to obtain. By carefully analyzing the interests of a family, it is a simple matter to decide upon the character of the home. The house may be dignified or quaint, formal or informal, magnificent or modest. A family which likes to lounge informally in a cozy sitting room would be unhappy in a formal Georgian drawing room. A similarity of character between occupants and house leads to a pleasant and comfortable existence in a "shelter for living."

Family Life. If a house is to fulfill its primary function of forming a background for family life, it must

First, satisfy a basic need by providing shelter, and,
Second, promote congenial home life by
  efficient planning,
  elimination of annoyances,
  provision for individual interests.

Architects, builders, and home planners have more than a casual and transitory obligation to society, for it is in the home that much of our early training in good behavior, ethics, religion, manners, and moral obligations is secured. A house should be planned so that it is conducive to proper living. If children are to be taught neatness and orderly habits, the necessary closets, shelves, and rooms must be provided. If correct methods of study are to be encouraged, children should not have to shift for themselves in finding a place to do their homework. If the necessary respect for parents is to be developed, there should not always be conflicting points of view about the use of the living room. If the housewife is to have energy enough left at the end of the day to be an amiable companion during the evening hours, the house must be planned so efficiently that the minimum amount of effort is required for its maintenance.

Chapter 10

BUILDING OR BUYING

There are many problems connected with acquiring a home which may precede the problems of planning. After the prospective home owner has analyzed his needs and has arrived at a general idea of the type and size of house which he wishes, he must decide upon the method of acquiring this shelter. He must decide whether he is to build a house, either with the services of an architect or general contractor or both, whether he is to buy a house "built for the market," or whether he is to remodel an old house. He must determine how much he can afford to pay for a home and by what means he can finance it. He must make sure that he secures good construction and proper mechanical equipment and that the property is correctly and adequately landscaped.

The foregoing are all important considerations but some of them are often given undue attention by the average designer or builder of a home. Too often houses are planned from the point of view of cost and style, rather than after a study of the activities of those who will occupy them. Considerations of cost and style will probably never be neglected by home builders, but a serious and detailed study of the fundamental influences which should affect house design is often postponed indefinitely. In order to minimize the possibility of this neglect, this book begins with a discussion of the physical and social environment in which every home must be placed. In this way the basic influences of house planning are first established, and the designer is able to appreciate the significance of cost, construction, and appearance as they are related to the needs of a family.

Methods of Acquiring a Home

Retaining an Architect. To employ a qualified architect is usually the safest and most economical procedure when building. The architect is a professional man, the same as a lawyer or a doctor, and he has the same high standards and ethics. He must undergo the same rigorous training

and apprenticeship and, in most states, must pass a difficult four-day examination covering the fields of design, construction, mechanical equipment, and specification writing. The competent architect is also expected to know something about real estate, finance, business law, and engineering. He is qualified to advise the client about desirable locations, peculiarities of site, public utilities, economical planning, and proper exterior treatment. His fee is modest considering the time which he spends in consultation and the preparation of the plans. It is often saved several times over in the elimination of bad construction, poor materials, faulty plan arrangements, and other costly mistakes.

An architect prepares preliminary sketches for the client's approval. He draws a complete set of working drawings and writes a set of specifications calling for materials of the correct kind and quality. He asks for bids from a number of reliable contractors and awards the contract to the lowest and most competent of the bidders. He superintends the construction of the house and insures that the plans and specifications are followed in every detail. He protects the interests of his client. By reason of the architect's knowledge of materials, construction, and creative design, the client is assured of a thoroughbred home, not a mongrel.

Buying a Speculative House. This is a house which is built for the market. It is a ready-made house, designed for the average family. It may or may not fit the needs of the prospective purchaser and should be scrutinized with this in mind. The buyer can see the treatment of the exterior and the interior but can do little toward checking the adequacy of the construction. If he can follow the progress of the house during the time it is being built and if he is familiar with the requirements of sound construction, then he can buy with confidence.

The buyer must realize that he is paying a premium for being relieved of the details and risks connected with building. The builder assumes these risks and the buyer must pay for them. To the actual cost of the house, the builder must add sums for advertising, selling, financing, overhead, and a profit of varying percentages. Very often a builder buys a large tract of land for subdivision purposes and makes an additional profit on each individual lot.

Buying a speculative-built house is a simple and easy way of acquiring a home, if the owner can be assured of good design, construction, and price. However, the average buyer does not have experience enough to judge the worth of a house and he must rely upon the integrity, intelligence, and good taste of the builder.

Buying a Prefabricated House. Some of the foregoing statements can be applied generally to prefabricated houses. The buyer usually makes a selection from a catalog of stock plans or from sample houses already erected. (See page 87.) While he can see typical wall, floor, and roof units before they are assembled, he finds it difficult to evaluate them in terms of his limited experience, and he must again depend upon the reputation of the manufacturer or upon the opinions of competent advisers.

Dealing with One Organization. In recent years organizations have been developed which design, build, and finance houses without the collaboration of other agencies, thus taking on the duties of both the architect and the contractor.

This would seem to be a desirable and logical arrangement for it concentrates under one head all the intricate problems of design, construction, and finance. But again the success of the venture depends upon the ability and character of the builder. If he is trained in the field of architecture or if he employs capable designers, and if he uses proved methods of construction, the results may be satisfactory. However, the buyer must remember that he is paying for all these services; nothing is free. He should also remember that the builder must make a profit—the size of which depends upon competition, the alertness of the buyer, and the integrity of the builder.

Building from Stock Plans. Stock plans, or those from which several houses of the same design are built, are furnished by many organizations. Their cost varies from nothing to $10 or more. Sometimes they are drawn by reputable architects and are well designed; sometimes they are not.

Stock plans are usually for the average family and the ordinary site. The greatest disadvantage in using them is the difficulty in finding just the right one to fit the owner's lot, needs, and finances. It is not an easy matter to make changes in stock plans because one change leads to another and thus complications arise. Stock plans should not be turned over to a builder inexperienced in design with the expectation of having them modified to suit the interests of the owner's family. Instead, any changes should be made by someone trained in the field of architecture, so that the client might as well employ an architect at the beginning and secure complete services. If the drawings and specifications are used as they are received, it will be found that they are usually very brief and that much is left to the judgment of the builder. The drawings are not accompanied by the architect's supervision, which guards the client's interests, and again the builder must be relied upon to furnish honest workmanship and materials.

Buying an Old House. It may be that, owing to certain economic and market conditions, a prospective home owner will find it profitable to buy an old house and modernize it. This method of acquiring a home may be satisfactory if the building is structurally sound, if too many changes are not necessary, and if the uncertainty of final costs is realized at the beginning. However, the details of a modernization program are too complex to discuss at this point. An analysis of some of the factors involved may be found on page 79.

The foregoing remarks about the various methods of building and buying must necessarily be brief but they should call attention to the fact that each scheme has its own advantages and disadvantages. The prospective home owner should, therefore, make his own individual and personal decision after adequate study and investigation.

Chapter 11

THE FINANCIAL ASPECTS OF BUILDING

The Cost of the Home

The analysis of the occupation and income of a family in Chapter 9 affords a basis for consideration of the amount of money which should be spent for shelter. When a compromise is reached between income and family needs, the home planner is ready to proceed with the problems of house design. Methods of arriving at this compromise are suggested in the following pages.

The Lot. It is to be remembered that the initial cost of the land itself is not the only expense connected with the purchase of the lot. In addition, there are the expenses of the survey to determine the correct boundary lines, the examination of the title, the bringing in of gas, electricity, and water from the street to the house, the grading and landscaping, and the construction of drives and walks. Most of these are variable factors, depending upon the size and topography of the lot and the location of the house. The charges for title examination may also vary with the community; however, with a typical organization they may be about 2 per cent of a $1,000 mortgage or 1 per cent of the mortgage up to $6,000, with an additional one-half of 1 per cent for sums over $6,000. In addition to these expenses, the prospective owner should inquire about back taxes and make sure that there are no hidden special assessments.

The House. One of the first things which a prospective home owner wants to know when he sees a sketch of a proposed house is "How much will it cost?" A preliminary estimate may be obtained from a contractor by the submission of preliminary plans, but this is time consuming and expensive.

Cubic Foot Costs. A rough estimate may be secured quickly by cubing the plans, or by figuring the cubic contents of the house. This is done by measuring the number of square feet contained within the outside boundaries of the walls as shown on a floor plan and multiplying this sum by the

height of the building. The height is found by measuring the distance from the bottom of the basement floor slab to a distance half way between the second-floor ceiling and the ridge of the roof. This gives the number of cubic feet in the house. Open porches may be figured as one-half cubage. This total number of cubic feet should then be multiplied by the cost per cubic foot, which has been arrived at by studying the costs of innumerable houses already erected in the same locality which used similar construction and materials. Naturally these costs vary with different parts of the country, but it has been found that the following are sometimes representative:

Minimum house (Fig. 1*B*), 25 cents per cubic foot.
Inexpensive house (Fig. 2), 30 cents per cubic foot.
Medium-priced house (Fig. 3), 40 cents per cubic foot.
Expensive house, 50 cents per cubic foot.

As an example of arriving at approximate costs by cubing, let us use the inexpensive house shown on page 76, with basement included.

Main part:
Horizontal area—26 feet $\times$ 26 feet = 676 square feet.
Height—9 feet + 9 feet + 8 feet + 4 feet = 30 feet from foundation footings to average height of pitched roof.
Cubage—676 square feet $\times$ 30 feet = 20,280 cubic feet.
Garage:
Horizontal area—23 feet $\times$ 10 feet = 230 square feet.
Height—1 foot + 8 feet + 1 foot = 10 feet approximately.
Cubage—230 square feet $\times$ 10 feet = 2,300 cubic feet.
Total—20,280 cubic feet + 2,300 = 22,580 cubic feet.
Cost—22,580 cubic feet $\times$ 30 cents per cubic foot = $6,774.

Square-Foot Costs. However, cubic-foot costs vary considerably with different plans, materials, and types of construction. It is necessary to know a great deal about these items and their local prices before even a rough estimate can be made. Another method of estimating is based upon the cost per square foot of the actual livable, finished floor area, which is sometimes found to be more reliable. The figures used herewith are derived from an analysis of the specifications of three houses which are classified according to the quality of their construction and materials. The costs given correspond roughly to the cubic-foot costs listed above and might be typical of certain parts of the country with certain market conditions. Costs used in this connection are intended only to show methods of arriving at approximate estimates. Accurate and applicable figures may be obtained by ascertaining the range of local building prices.

TYPES AND COSTS

Items	Minimum	Inexpensive		Medium-Priced	
Foundations	cement block	8-in. concrete		10-in. concrete	
Structure	wood frame	frame or 8-in. brick		brick, furred inside	
Exterior walls	wood siding	frame or 8-in. brick		brick, furred inside	
Roof	asphalt shingles	wood shingles		slate	
Insulation	none	ceiling		walls and ceiling	
Sheet metal	galvanized iron	galvanized iron		copper	
Interior walls	ply wood	plaster		plaster and tile	
Flooring	yellow pine	hardwood		hardwood and tile	
Interior trim	minimum	stock		special	
Windows	mill, double hung	prefit		prefit	
Doors	stock	stock		special	
Plumbing	prefabricated	inexpensive		better quality	
Heating	room heater or pipeless furnace	hand-fired gravity hot air		automatic forced warm air	
Lighting	minimum	approved layout		engineered layout	
Basement	no basement	included		included	
Garage	none	extra unless in basement		extra	
	one-story	one-story	two-story	one-story	two-story
Cost per square foot for average-size house	$4.50	$6.00	$5.00	$7.50	$6.50

It should be remembered that the size and type of the house affect the basic cost per square foot. A small one-story house must have about the same amount of heating, plumbing, and wiring as a larger one so that its square-foot cost is relatively higher. Also a two-story house requires less foundations and roof than a one-story house of the same floor area so that its square-foot cost is relatively lower.

According to the above figures, the houses illustrated on pages 74, 76, and 78 might conceivably cost:

Minimum house (Fig. 1*B*):
684 square feet × $4.50 per square foot = $3,078.
Inexpensive house (Fig. 2):
1,352 square feet × $5.00 = $6,760.
plus garage at $2.00 per square foot ($460) = $7,220.
Medium-priced house (Fig. 3):
2,190 square feet × $6.50 = $14,235.
plus garage at $2.25 per square foot ($990) = $15,225.

These figures will naturally vary with different localities and with fluctuating labor and material costs.

Ratio of Construction Costs. A question which is frequently asked in connection with building costs concerns the percentage of the total sum which goes into the different materials and operations. This may be answered by the following table, which shows an approximate division of the construction costs for an ordinary two-story, three-bedroom frame house:

Carpentry labor	19%
General contractor's profit	10
Millwork	10
Plumbing	9
Lumber	8
Excavations and foundations	8
Painting, papering	6
Plastering	6
Heating system	5
Flooring	4
Brickwork	4
Hardware	2
Wiring	2
Tilework	2
Roofing	2
Lighting fixtures	1
Sheet metal	1
Miscellaneous	1
	100%

Cutting Costs. On the average construction job involving the erection of a new house there is a conscious and determined effort to keep costs down to the minimum. Except in the case of expensive houses, the owner is interested in getting as much house as he can for the least money. This is due to the perversity of human nature and the inordinately high level of building costs in relation to average incomes. High costs are partly the result of the complexity of the building industry. By careful study, the architect, builder, and owner can effect minor savings by:

1. Building several houses at the same time with similar plans.
2. Using simple, compact plans, with resultant simple exterior, masses, shapes, roof lines, and construction.
3. Using stock sizes of lumber and stock moldings, doors, and windows instead of those made specially for the job.
4. Using inexpensive materials and mechanical equipment.

By following these and other suggestions it is possible to save a little here and a little there and to reduce the total cost by perhaps 10 per cent, as compared with more expensive construction and materials.

Those in the middle-income brackets must decide whether this cheapening process is compatible with their interests, while, unfortunately, those in the lower-income brackets have little choice in the matter. Even with these savings, the cost of essential and minimum housing is still much too high. For that group of people whose incomes fall within the $1,500 to $2,000 classification, or about 12 per cent of our population, it should be possible to provide acceptable homes costing not more than $3,500 to $4,500, including the land. Except for isolated instances, this has thus far not been possible; the homes which could be built for these sums do not meet the needs of the occupants or their preconceived conceptions of housing. (See low-cost housing, Chapter 13.)

Ratio of Costs to Income

Yearly Income. One should not go blindly into a building venture, not knowing whether he can afford the house which he has in mind. It is necessary for him to examine his yearly income and decide what portion of it can be set aside for housing. Each of us knows what his own family salary is but it would be interesting to compare it with those of others in the country. Taking into account our entire population, we find that

approximately two-fifths have incomes under $1,000
two-fifths have incomes between $1,000 and $2,000
one-fifth have incomes over $2,000

It is from incomes like these that savings must come for the building of homes.

There is a generally accepted rule which will enable those interested to arrive at approximate conclusions concerning the amount they can afford to pay for a home. It is to the effect that the total cost of the house and lot should not exceed two years' income. This applies to those with children, and may be raised to two and one-half years' salary for those without children. In all except the low-income brackets, there is a tendency to exceed this figure owing to the high costs of housing and the high standards of living. Also this rule of 2 or 2½ to 1 was made when construction loans were paid off in a comparatively short time, say ten to fifteen years, with correspondingly high monthly payments. In recent years, with government encouragement, long-term loans of twenty to twenty-five years are possible, with a considerable reduction in the size of the monthly payments. Current figures show that many families, with government aid and long-term loans, are buying homes costing three to three and one-half times their yearly incomes.

Another way of establishing a rule is to say that the sum set aside for rent should not exceed one-fourth of one's salary. It may sound a little queer to talk about the home owner paying rent, but he does pay rent just as surely as does the person who actually lives in a rented dwelling. The rent which he pays is composed of:

1. Interest on mortgage, which in recent years has varied from 4½ to 7 per cent.
2. Interest on amount invested by owner, or the 2 to 5 per cent return which would otherwise come from savings.
3. Physical depreciation, or 2 per cent of the cost of the house.
4. Neighborhood depreciation or ½ of 1 per cent of the cost of the entire property.
5. Upkeep, or 2½ per cent of the cost of the house.
6. Taxes, or 2½ per cent of the cost of the entire property.
7. Insurance or ¼ of 1 per cent of the cost of the house.

Or, if all the various items are figured carefully and added, it will be found that the average home owner pays 10 per cent of the total cost of the entire property each year in rent in the form of the expenses enumerated below.

On a $5,000 home, $4,000 may go into the cost of the house and $1,000 into the lot, and expenses are:

Interest on $4,000 mortgage @ average of 3 per cent	$120
Interest on $1,000 invested by owner @ 4 per cent	40
Physical depreciation, or 2 per cent of $4,000	80
Neighborhood depreciation, or ½ of 1 per cent of $5,000	25
Upkeep, or 2½ per cent of $4,000	100
Taxes, or 2½ per cent of $5,000	125
Insurance, or ¼ of 1 per cent of $4,000	10
	$500

or 10 per cent of the cost of the property, or one-fourth of the $2,000 yearly income necessary to buy a $5,000 home on the basis of two and one-half times the income. In the above table, the item of neighborhood depreciation may be omitted during the years when the community is growing or appreciating in value.

Actual rents paid by renters vary in different parts of the country, with the location—either city or village—and with different races, occupations, and income brackets. Many authorities agree that about 25 per cent of one's income may be spent for actual rent, but it is to be noted that, unfortunately, rents do not remain in constant ratio to incomes. Persons with small incomes pay larger percentages for rent, and they are the ones who

can least afford to do so. This reduces the standard of living that can be maintained, which in turn affects the appearance and durability of the habitation itself.

House and Lot. There exists a definite ratio between the cost of the house and of the lot. The price paid for the lot usually indicates the value of property in that particular neighborhood and it thus tells something of the character of the surrounding houses. It is obvious that a $1,000 lot is in a cheaper neighborhood than one costing $4,000. The location of the site and its relationship to other physical factors decide its value, for earth itself has little intrinsic worth. A handful of dirt from Park Avenue looks the same as one from Jones Street.

It is not good business to build a cheap house on an expensive lot or an expensive house on a cheap lot. The former means that the house does not match its neighbors in cost, size, or quality, and is, therefore, a poor relation. The latter means that the house will depreciate in value as soon as it is built, because of the humble neighborhood. The accepted ratio which should exist between the house and the lot is:

the house may cost from three to five times the price of the lot.

The average ratio is probably four to one, or, of the total expenditure, the house costs 80 per cent and the lot 20 per cent.

Financing a Home

Income. Before proceeding far with plans for building, the prospective home owner should make a study of his income and analyze its capacity for providing a "shelter for living." For that matter, every family should have a budget based on its income and standards of living. One method of analyzing the income is as follows:

1. Income for necessities,
   to provide food, clothing, and shelter, and to care for repairs and replacements.
2. Income for conveniences,
   to provide labor-saving devices, automobiles for transportation, extra education, adequate furniture, and facilities for relaxation.
3. Income for comforts,
   to provide domestic help, vacations, annuities, and extra comfort in furnishings.

The distinctions between the various classifications will naturally vary in

the different income brackets, so that each individual should interpret this analysis in the light of his own financial status and mode of living.

The actual inventory of one's income is a personal matter and must be made before any questions about building can be answered. Such items as the size of the family, future needs, educational desires, travel, retirement annuities, and general standards of living must be considered. One should make a definite budget, setting aside sufficient amounts based on living costs compiled over a period of several years. The following budget may be typical of an average family buying a home with an income of $2,400 a year:

Budget	Percentage of Income
Operating Expenses	
Food	25
Clothing	10
Shelter	20
Interest on mortgage, taxes, insurance, repairs, cost of gas, electricity, water, telephone, replacements, laundry, and domestic help	
Transportation	10
Gasoline, oil, repairs, license, tires, insurance	
Insurance	2
Carrying charges of life insurance	
Recreation and Advancement	5
Vacations	
Entertainment	
Newspapers, magazines, books	
Lectures	
Club dues	
Savings	21
Payments on principal of mortgage	
New furniture	
Returnable portion of life insurance	
Savings accounts and investments	
Health	5
Payment of hospital and doctor bills	
Miscellaneous	2
Those items which are not otherwise listed	

From one's savings and investments comes the sum necessary for the initial payment on a new home. Most people do not have available funds equal to the entire cost of a house and lot and, therefore, have to borrow the remainder. Before the days of government aid, it was necessary for the prospective owner to have at least 30 or 40 per cent of this cost, but in recent years this has been reduced to 20 or even 10 per cent and it is possible to borrow up to 80 per cent or more. Under the Federal Housing Administration plan the down payment may be as low as 10 per cent of the total appraised value of properties of $6,000 or less, which are owner-

occupied and approved before construction is begun. The time allowed for repayment may be twenty-five years. For homes appraised at an amount between $6,000 and $10,000, the down payment may be 10 per cent of the first $6,000 and 20 per cent of the remainder, while for homes costing as much as $16,000 the down payment may be as low as 20 per cent of the total appraised value. In both these plans, the time of repayment may be twenty years.

After the amount of the initial payment is decided upon, it is necessary to scrutinize the family budget to find out if a sufficient amount can be set aside for the weekly or monthly payments to the lending institution. This calls for a study of the financing scheme which the owner is to follow.

Financing Methods. The sum necessary for the financing of a home may be borrowed from several sources, the most important being a building-and-loan association, a bank, or a life-insurance company. A loan from a bank is usually for a short period of three to five years and must be renewed at the current interest rate. An insurance company lends for a longer period of time, and the loan is repaid in monthly payments, which include a portion of the principal and a month's interest upon the amount due. The building-and-loan scheme is more of a mutual-assistance scheme. In most cases, every borrower purchases stock in the association and thus shares in its profits to the extent of his investment. As a stockholder he can borrow the amount above his own savings necessary to take care of the cost of the entire project. The amortization or repayment of the debt in periodical installments usually covers a period of twelve, fifteen, or twenty years, depending upon the ability of the borrower to pay. These payments cover interest and part of the principal, and it is possible to learn exactly how much of the principal remains unpaid at any time.

In order to borrow money from a lending institution, an application for a loan is made, after which an appraisal is made of the property or the plans and specifications. From this it is determined how much it is safe to lend on this particular house and lot, taking into account not only the property itself but the character and income of the applicant. The interest rate, which has dropped in recent years from 6 or 7 per cent to around 5 per cent, is then decided upon together with the amount of the monthly payments. A payment equal to 1 per cent of the mortgage per month, including average rate of interest and part of the principal, will amortize the loan in about twelve years. A payment equal to three-quarters of 1 per cent per month requires approximately sixteen years to cancel the mortgage. This plan is typical of many building-and-loan associations and is not to be

confused with the Federal Housing Authority scheme of providing insured mortgages.

The following schedule shows the monthly payment per $1,000, on an FHA mortgage, including principal, interest at 4½ per cent, and mortgage insurance of ½ to 1 per cent. These payments do not include taxes or insurance.

Loan Term	Monthly Payment
5 years	$18.95
10 years	10.74
15 years	8.04
20 years	6.73
25 years	5.96

Thus for a $4,000 loan on the $5,000 home discussed on page 68, the owner will pay $4 \times \$6.73 = \$26.92$ per month if the mortgage is to be amortized in twenty years under the FHA plan. If the owner pays 1 per cent of the mortgage per month to a building-and-loan association, his payments will be $40 a month for approximately twelve years. If he pays three-fourths of 1 per cent per month, his payments will be $30 per month for approximately sixteen years.

From the foregoing figures, the prospective home owner can decide which type of mortgage and loan term will be best suited to his ability to pay.

Chapter 12

COSTS AND RESULTING SHELTER

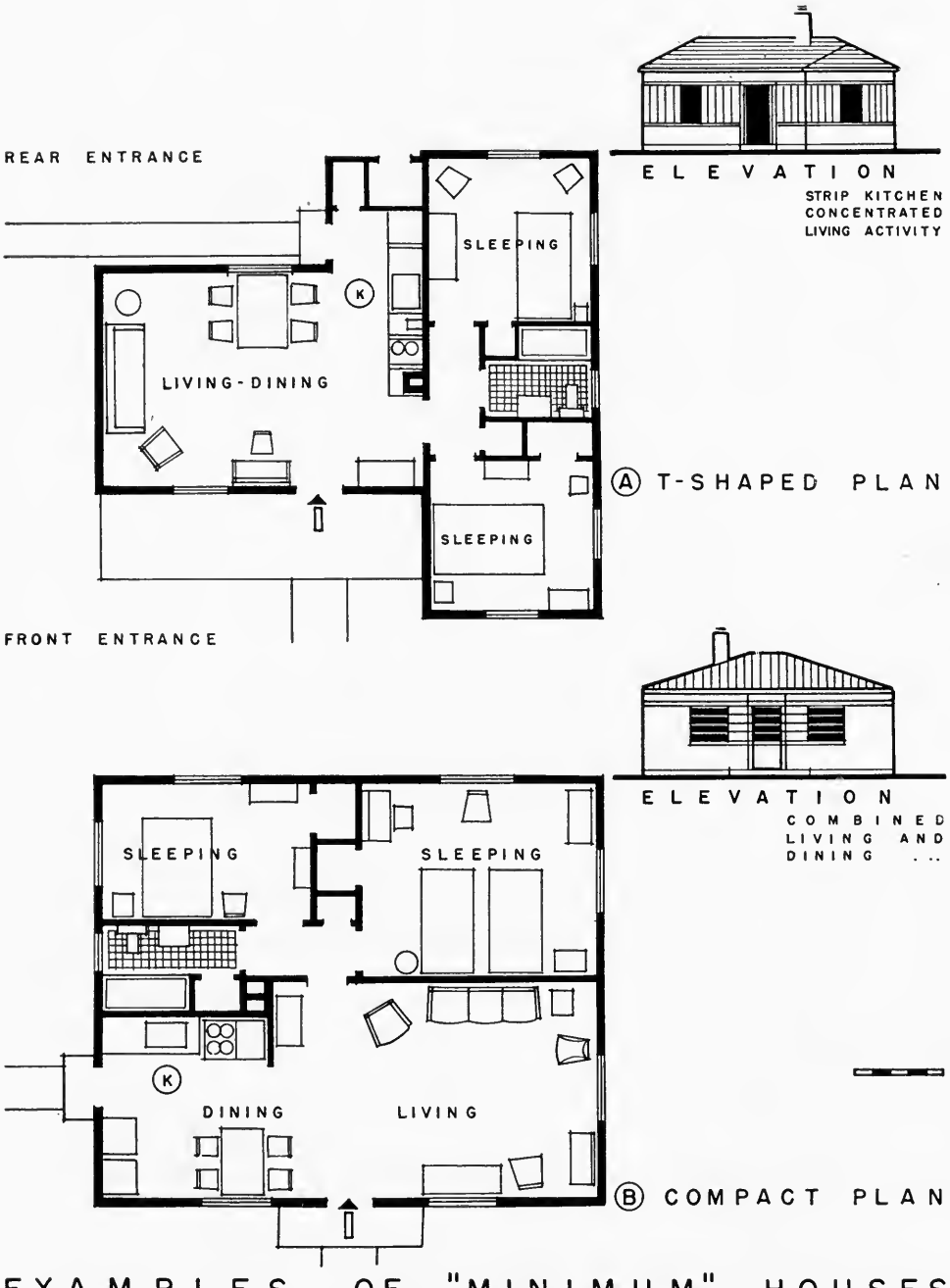
Costs and Size

Cost is probably one of the first items discussed when a new home is being planned, and it is cost which often determines the size, shape, and arrangement of the structure. In the preceding chapter we have discussed in detail various methods of estimating prices and of arriving at the desirable amount to be invested in a home. Let us now be more general and confine our remarks to the influence of cost upon plan types and the resulting structures.

Houses may vary in price from something under $5,000 to sums many times that amount, depending upon the financial status and the interests of the owner. Any classification must be general, rather than specific, because it would be difficult to group plan types according to any one definite price. A house costing $8,000 might have the same physical characteristics as one costing $10,000, varying only in details which are not conspicuous to the casual observer. However, houses may be thought of as

1. The Minimum House.
2. The Inexpensive House.
3. The Medium-Priced House.
4. The Expensive House.

It is, of course, difficult to assign any particular house to one of the above groups since the personal element is too important to permit such arbitrary classification. The medium-priced house for the banker would be the expensive house for the skilled mechanic. We must, therefore, define a house according to the income and interests of the average citizen who might have easy access to and interest in a book on home design, keeping in mind that construction costs vary with the different parts of the country. With a better coordination of the building industry, the introduction of new materials, and the development of prefabrication and mass production,



EXAMPLES OF "MINIMUM" HOUSES

FIG. 1. Plan *B* is a less expensive type than plan *A* because it is more compact and has fewer corners or breaks in the exterior walls. Minimum houses call for concentration of activities.

the medium-priced house of today may become the inexpensive house of tomorrow.

The Minimum House. Many people have aspirations which do not include living in a house which has been reduced to its essentials. They would rather leave this to the underprivileged for whom clean, warm shelter is more desirable than the slums in which they are now living, or at least to those who can afford only those homes costing less than $5,000. But this type of house represents perhaps the biggest potential market in the residential field today, when we realize that probably one-half of our population does not live in even sanitary, convenient quarters. It offers a challenge to architects, manufacturers, builders, and laymen—a challenge to their ingenuity and a financial reward for those who may develop a solution. Two houses of this type are shown on page 74. According to present-day building costs they offer a quality and quantity of habitation within the reach of those with incomes between $1,500 and $2,000. They provide comfortable shelter and some of the conveniences which contribute to a congenial family life. Compactness and simplification have reduced these houses to their essentials. The physical characteristics of this type of a house may be:

1. Combination living and dining area with separate kitchen or
2. Combination living, dining, and cooking area.
3. Combination cooking and dining area.
4. Compact sleeping quarters with minimum equipment.
5. No basement, with utility room for heater and laundry on first floor, or without utility room.
6. Mechanical equipment—bath, kitchen, heating, wiring, plumbing—preassembled in units or at least simplified and condensed.
7. Interior and exterior finishes of plain and durable materials.
8. General construction, simple and easy of erection; perhaps prefabrication or mass production.

The Inexpensive House. It is possible to think of this type of house as belonging to those individuals who have incomes between $2,000 to $4,000, and who wish to establish a permanent location for the maintenance of family life. A home in this classification might cost between $5,000 and $10,000. This house may be one or two stories high, with perhaps two or three small bedrooms and the usual areas for living activities. Inexpensive materials and construction are necessary to keep costs down, but the owner can indulge his fancies with greater freedom than can those who build the minimum house.

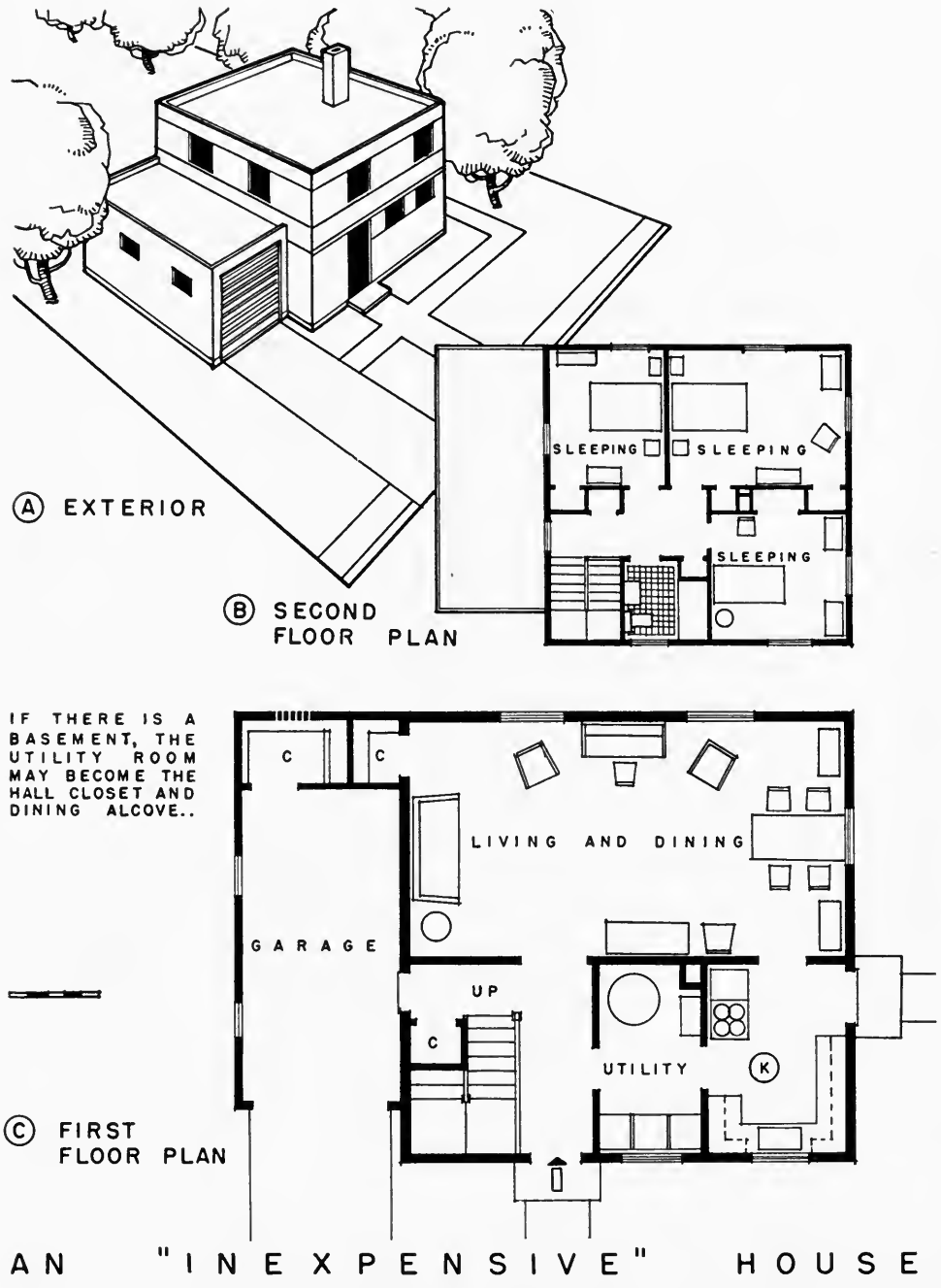


Fig. 2. A compact plan with little waste space, excellent circulation, and economical construction. Utility room may contain heating unit and laundry trays or there may be a basement.

An inexpensive house should contain:

1. An adequately equipped kitchen, perhaps with a dining alcove as a substitute for a regular dining room or
2. A combined living and dining area.
3. A small living room; large enough, however, to contain the customary groups of furniture and provide easy circulation.
4. Enough small bedrooms to prevent crowding, with one bathroom.
5. Provision for outdoor living, with one porch or terrace.
6. Attached one-car garage.
7. Sound but inexpensive construction and materials.

An inexpensive house is illustrated on page 76. It has a utility room for heater and laundry next to the kitchen, eliminating the necessity of a basement. The storage space thus lost has been added to the rear of the garage. A basement may be added to this house by extending the stairway.

The Medium-Priced House. It is difficult to decide where the inexpensive house stops and the medium-priced one begins. Those which are not border-line cases are easily identified, but the actual line of demarcation between the two is not so clear. The medium-priced house has about the same general requirements as the less expensive one but with the addition of those rooms and features which make for greater ease and comfort in living. Incomes in excess of $4,000 are necessary for the construction of houses in the "medium-priced" class. Homes in this class might cost between $10,000 and $20,000. In addition to the customary rooms, the medium-priced home may include:

1. More space in the major rooms.
2. A library, study, den, or quiet room.
3. Additional bedrooms, sitting room, or guest room.
4. An extra bath.
5. A downstairs lavatory.
6. A recreation room, hobby room, or workroom.
7. A two-car garage.
8. More built-in features, such as closets, cases, and furniture.
9. A maid's room.
10. More expensive construction and materials.

Figure 3 shows a medium-priced house incorporating the features listed above. The plans on page 130 illustrate another house which comes under this classification.

The Expensive House. No attempt will be made to list the various items which may be found in a house of this description. This term is to

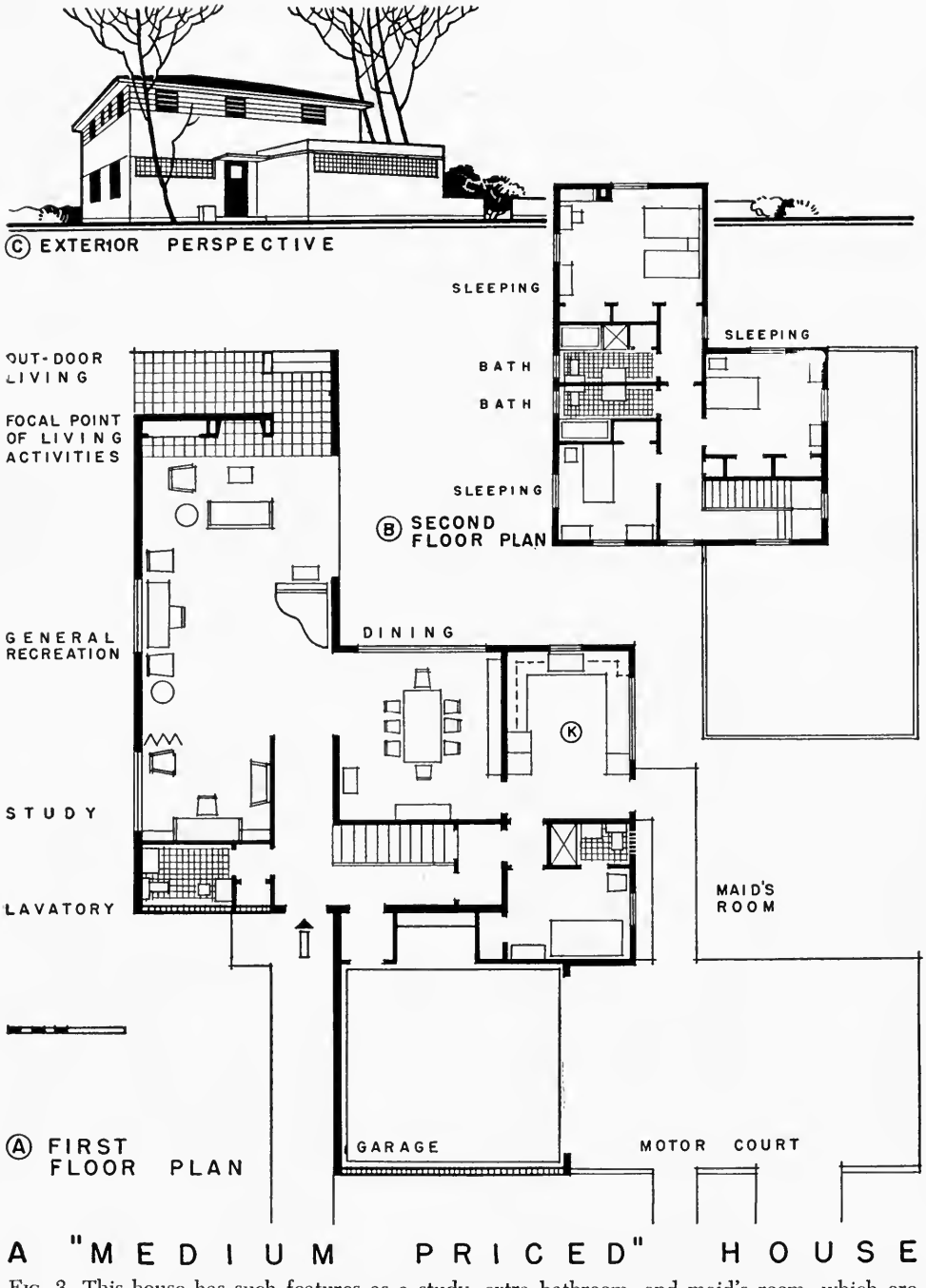


FIG. 3. This house has such features as a study, extra bathroom, and maid's room, which are not usually found in inexpensive homes. The irregular outline of the exterior adds to the cost.

be construed as designating those houses upon which there is not the restraining hand of economy of cost. Here the owner may include as many rooms as he wishes, and his furnishings may be as luxurious as his inclinations may demand. When the limitations of cost are removed, the process of design becomes easier and, at the same time, less interesting. Usually there is plenty of land available for a building site and an opportunity to use the more expensive forms of materials, both old and new. Solutions suggest themselves quickly, and their consummation is unhindered by the restrictions imposed on the less expensive houses.

The Modernized House

Instead of building a new house, either inexpensive or expensive, some families may prefer to remodel an old one. It is difficult to evolve a set of principles which apply only to this particular method of securing shelter. For example, the general floor plan and the various rooms of an old house may be judged and remodeled according to the rules of planning and design discussed throughout this book. However, the situation confronting the family that proposes to modernize will be analyzed very briefly in the following pages.

Some of the advantages and disadvantages of modernizing are:

Advantages

1. Low purchase price of property.
2. Improvement in rental or resale value after modernization.
3. Buying in an established neighborhood.

Disadvantages

1. Uncertainty of costs.
2. Uncertainty of final results.
3. Possible difficulties with construction and mechanical equipment.
4. Lack of complete satisfaction owing to necessary compromises.

Types of Modernization. There are many degrees of remodeling or modernization ranging from simple refurbishing and redecorating to almost complete rebuilding. (See page 80.) The condition of the structural system, the convenience of the plan arrangement, and the external appearance of the house, together with the wishes, needs, and finances of the family, are the factors which determine the amount of remodeling necessary and possible. A modernization program may call for one or all of the following operations:

1. Repairing the general physical structure.
2. Correcting an inconvenient or outmoded plan, by major changes in exterior and interior walls (see page 122).
3. Changing shapes of rooms which are too large or too small by moving interior walls.
4. Replanning basement to include recreation room or garage.
5. Reconditioning unfinished attic to provide additional living space.
6. Adding needed rooms, such as a study, guestroom, bedroom, or extra bath or lavatory.
7. Changing a single-family house into apartments.
8. Rearranging the plan of and installing modern equipment in kitchen and bathroom.
9. Replacing outmoded lighting, heating, and plumbing with modern equipment.
10. Insulating walls and ceiling.
11. Improving the appearance of the exterior by changing roof lines, projections, porches, windows, and entrances.
12. Decorating the interior and exterior.
13. Landscaping the exterior with foundation planting to minimize undesirable and to accent desirable features.

Procedure. These steps may be accomplished by the same methods used in planning a new house—methods enumerated elsewhere in this book. In a remodeled house, the construction and materials should be satisfactory in type, size, and durability; the plan should function efficiently with the proper thought given to circulation, flexibility, and zoning; the various rooms should be adequate in size, with provisions for necessary wall spaces and furniture arrangements; the interiors and exteriors should be pleasing in appearance with reference to proportions, composition, and color; and, finally, the mechanical equipment should meet the requirements for a modern house. The following questions will call attention to these factors and will indicate some of the problems which the prospective modernizer of an old house must look for in the process of remodeling.

Structural System

Do the foundation walls show cracks, settlement, or dampness?
Are the sills and floor joists adequate in size, bearing, spacing, and bridging, as revealed by the absence of vibration and settlement?
Are there any signs of termites or dry rot?
Are the vertical walls free from evidence of structural weakness?
Are the roof rafters adequate in size and spacing?

Exterior

Is the wood siding or stucco free from deterioration or cracking, and is the brickwork sound and impervious to moisture?

Are the shingles, slate, tile, and flashing of the roof properly installed and in good condition?

Do the doors and windows fit closely and is weatherstripping necessary?

Are the chimneys free from settlement and cracks?

Is the exterior pleasing in appearance or, if not, can it be corrected with a minimum amount of change?

Are the proportions of the general mass satisfactory?

Are the doors and windows located in such a way as to produce an interesting composition?

Interior

Do the interior walls show evidence of plaster cracks?

Are the plastered surfaces in good condition?

Are the proportions of the rooms satisfactory?

How much decorating will be necessary?

Plan Arrangement

Is the plan satisfactory except for minor changes?

Are the rooms correctly related to each other?

Can the rooms be combined, or made larger or smaller without expensive changes?

Can additions be made and good circulation still be retained?

Is the stairway conveniently located or must it be moved?

What changes will give better circulation and a more flexible plan?

What changes will produce a more convenient grouping of furniture and better light and cross ventilation?

Mechanical Equipment

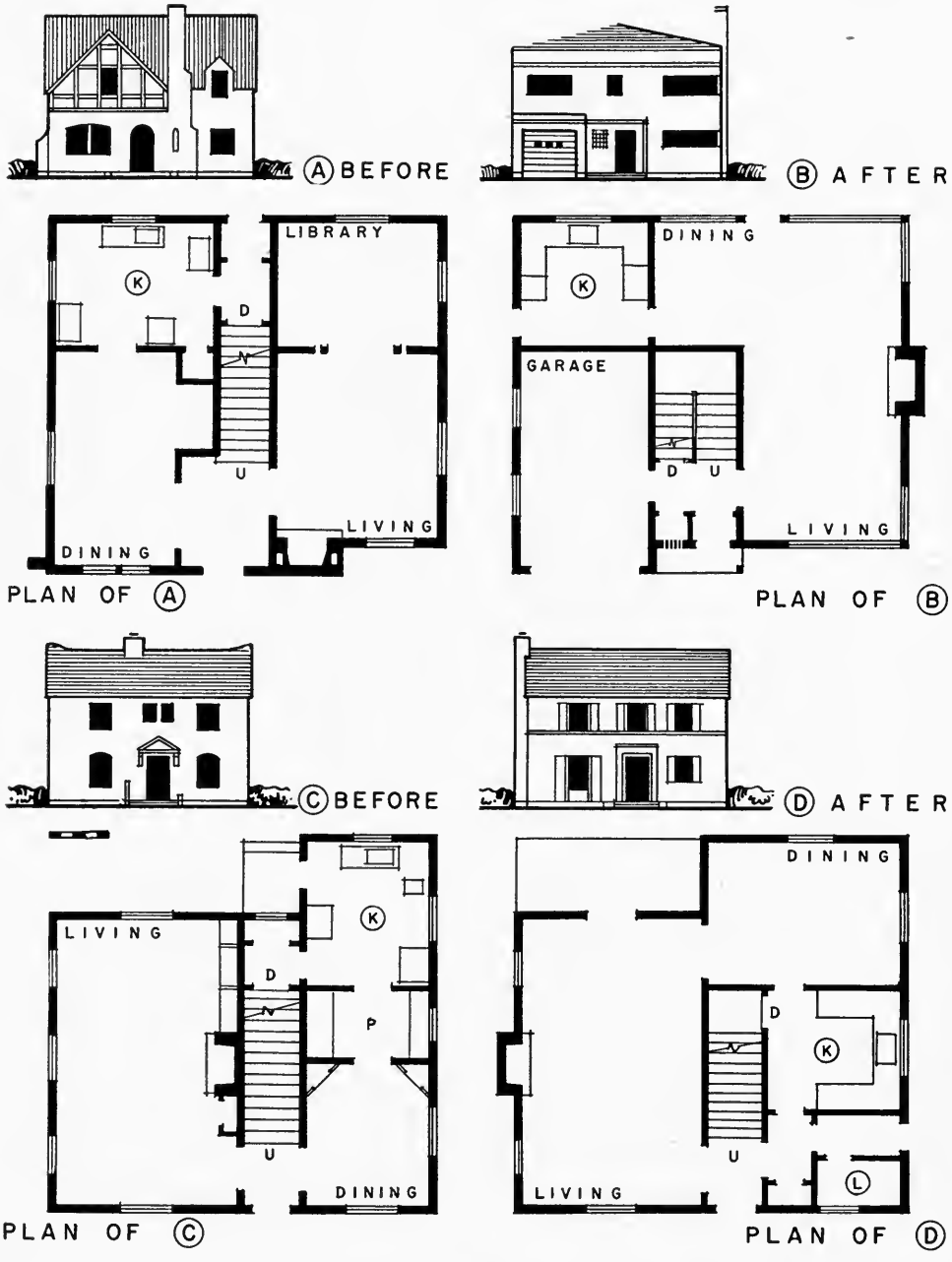
Is the heating plant adequate, and, if not, can it be revamped in a satisfactory manner?

What is the condition of the plumbing system and what changes are necessary?

Is the wiring adequate for the increased load? Are the convenience outlets and fixtures satisfactory in number, location, and character?

Will the construction of the house—the size and direction of joists and studs, and the location of walls—lend itself to a practical and economical installation of new mechanical equipment?

The foregoing questions suggest only a few of the factors which must be considered in remodeling an old house and indicate that there is no brief



EXAMPLES OF MODERNIZATION

FIG. 4. Plans *A* and *B* show major changes which were necessary to secure improved circulation, flexibility, and exterior design. Plans *C* and *D* illustrate improvements with minor changes.

set of rules to guide those who elect to engage in a program of modernization. Each remodeling job is a special problem, as illustrated on page 82, but it may be analyzed by the principles and suggestions enumerated here and elsewhere in this book. A reconditioned living room or kitchen should meet the same requirements of livability or efficiency as are demanded of similar rooms in a well-planned, new house. Remodeling an old house involves the same process of planning as does the design of a new dwelling; only the limitations of the existing structure render the problem many times more difficult.

In general, the final results should be achieved with the fewest possible changes in exterior and interior bearing walls and in the location of stairways. Often the most satisfactory and the least expensive results are secured simply by moving a few interior walls and doorways, removing an awkward porch or ugly projection, respacing some windows, adding some mechanical equipment and sanitary fixtures, and redecorating the interior and exterior. Any scheme involving major additions and changes may become unduly expensive for the imperfect solution which may result. The most uncertain phase of remodeling is the cost of the finished project. Changes are difficult to estimate because of the uncertainty of the amount of materials and labor involved and the structural difficulties which may be encountered. Modernizing may, therefore, best be left in the hands of a capable architect and builder with the hope that the compromises which must be accepted will justify the cost of the work.

The Rented Dwelling

The various types of new and old houses discussed in the preceding pages cover the majority of dwellings erected for shelter but they do not include all "shelter for living." We must, because of the space limitations of a single volume, confine our discussion largely to the single-family, detached house; but many people live in rented apartments, flats, and houses. Those in the lower-income brackets may have a large number of dwellings from which to make a selection but there is usually a uniformity in the quality of this shelter—a quality which must be accepted in spite of its deficiencies. Those in the higher-income brackets have access to better housing and may be in a position to exercise a more critical judgment in the choice of their habitation. The criteria developed elsewhere in this book may serve those families whose training, needs, and interests equip them to chose rented shelter with an analytical mind.

The decision to buy or rent is a personal and individual one and should be reached after a thorough study of one's financial limitations, occupa-

tion, ambitions, and family traits. Those who prefer to live in rented dwellings may do so because: (1) their future economic status is not assured; (2) they do not wish to assume the responsibility of home ownership; (3) they are not satisfied with the neighborhoods in which they can afford to buy; (4) their periods of employment are not steady or their places of employment are subject to change.

The family living in the rented house or apartment is "foot-loose and fancy-free." It can move from one community to another at will as its interests change, it has little responsibility in maintenance, and it is obligated to no mortgage. On the other hand, it develops no sense of pride in ownership, little feeling of permanency, and has little control over the inclusion of those desirable features in planning and exterior design which come with home ownership.

Rented places of habitation may fall into two general classifications: the single-family, detached house and the multiple house or the flat, duplex, or apartment. The rented apartment is a type of shelter popular with a large percentage of American families living in urban communities. If one refers to the plans shown on page 94, he will see that fundamentally most of the ventures in mass housing for rental purposes are simply compact arrangements of the basic units of a single dwelling and are the results of the same principles of planning. Apartments may vary in their construction costs, rentals, materials, and size and number of units in the same way that detached houses differ. Small, compact, and inexpensive units may be developed for those in the lower-income brackets while more pretentious quarters are built for those whose financial resources make more space and comfort possible.

Usually apartments are reduced to their essentials and are compactly arranged, partly through the desire of the occupants for relief from the responsibilities of a larger house and partly through the necessity of building economically in order to meet competitive rents and to insure a reasonable return on the investment of the owner. Of course there is a limit to which compactness may be carried unless several domestic activities are assigned to a single unit. This saving of space through the concentration of activities is illustrated in Fig. 8*A-B*. However, reducing space requirements to the minimum is a practice usually not conducive to fostering normal family life, and extreme examples of it should be reserved for the exceptional rather than for the average situation.

A book on house planning is of value to the renter of either a house or an apartment largely as a guide to the selection of a shelter best suited to his particular needs. It enables him to analyze his own requirements

and to evaluate a dwelling and a neighborhood in terms of these requirements. If he is familiar with the criteria which produce an efficient plan, a pleasing interior, and a satisfactory exterior, he is able to rent and furnish with greater confidence in the final results. He is in a position to determine whether a plan has good circulation, efficient room arrangement, ample wall spaces, and adequate mechanical equipment—factors which are discussed elsewhere in this book. A working knowledge of the basic principles of house design will enable the family which rents to choose a house or apartment which is more likely to be sympathetic with its mode of living.

Chapter 13

LOW-COST AND LOW-RENT HOUSING

While this book is written primarily for those who may design, build, or remodel single-family houses or for those who may rent adequate shelter, there remains a large majority of our population who cannot afford to own or rent any of the types of habitation described in preceding pages. The following discussion is, therefore, offered as an attempt to present a few of the housing problems of this group and some of the efforts directed at their solution.

With the social and economic changes of the past few years, attention has been focused sharply upon that portion of our people (about 65 per cent of our families) who must live upon family incomes of less than $1,500 a year. One of the many deficiencies of existence suffered by this group is inadequate housing, and, therefore, the term "low-cost housing" has become a popular subject of discussion. One commonly accepted but fallacious definition of the term is associated with subsidized mass housing. However, this term is more applicable to small dwellings built by private capital at the lowest possible cost, which enables us to reserve for group housing the phrase "low-rent housing." Therefore, "housing" may mean both:

1. the efforts of individuals—prospective home owners, builders, and architects—who are engaged in building acceptable dwellings to be sold at the lowest possible price, and
2. the efforts of groups of individuals or agencies—private or public—who are interested in building low-rental multiple houses, flats, apartments, or groups of houses with government subsidy or financing for those renters who cannot afford to buy or rent decent shelter.

Individual Effort

Many people have confused "low-cost housing" with the attempt simply to build inexpensively, or cheaply. Building costs are so high in relation to incomes that prospective home owners are often dismayed when prelimi-

nary estimates on their proposed homes become available. They begin to make inquiries about ownership of inexpensive houses only to discover that as yet "low-cost housing" offers little encouragement for home builders. As a result, low-cost housing often means trying to build an $8,000 house for $6,000, a $6,000 house for $4,000, or a $4,000 house for even less than this low sum. These people find that it is usually very difficult, if not practically impossible, to effect such economies. Thus far, attempts to reduce costs have generally meant using cheaper materials and construction and being satisfied with less space. Depreciation sets in more quickly, maintenance costs are higher, and the pursuance of a congenial family life is limited by quarters inadequate in size and arrangement.

Lower Costs. As has already been suggested on page 66, there are legitimate ways of cutting costs to some slight extent and still securing satisfactory shelter. Some of these methods are available now; others are being developed; still others may be classed as wishful thinking. Costs may be reduced somewhat by:

1. Lower material prices through improved marketing methods.
2. Lower labor costs through continuous instead of seasonal working periods.
3. Economies of large-scale operations including mass or quantity buying, repetitive units, and details which increase the efficiency of labor and lower overhead cost.
4. Prefabrication of the entire house, or increased use of prefabricated millwork, flooring, and plumbing units, and of doors and windows completely fitted and finished with glazing, weatherstripping, storm sash, and screens.
5. Standardization of room sizes, framing timbers, doors and windows, kitchen equipment, and ceiling heights.
6. Economical planning to eliminate waste space and expensive construction, as illustrated on page 88.

Prefabrication. It would be possible to provide a larger degree of low-cost housing if the techniques of building and subdivision of land were rid of the burden of non-creative expenses. The actual cost of the building is only about one-half of the total cost which the owner pays before the property is free of all encumbrances. The remainder goes for financing, profit on the land, sales commissions, overhead, and waste and inefficiency due to the lack of proper coordination of materials and labor. As yet no completely adequate answer has been found to the problem of our housing needs. There are those who believe that prefabrication offers the solution; that the use of large units which can be manufactured in the shop, transported to the site, and assembled quickly will replace the construction

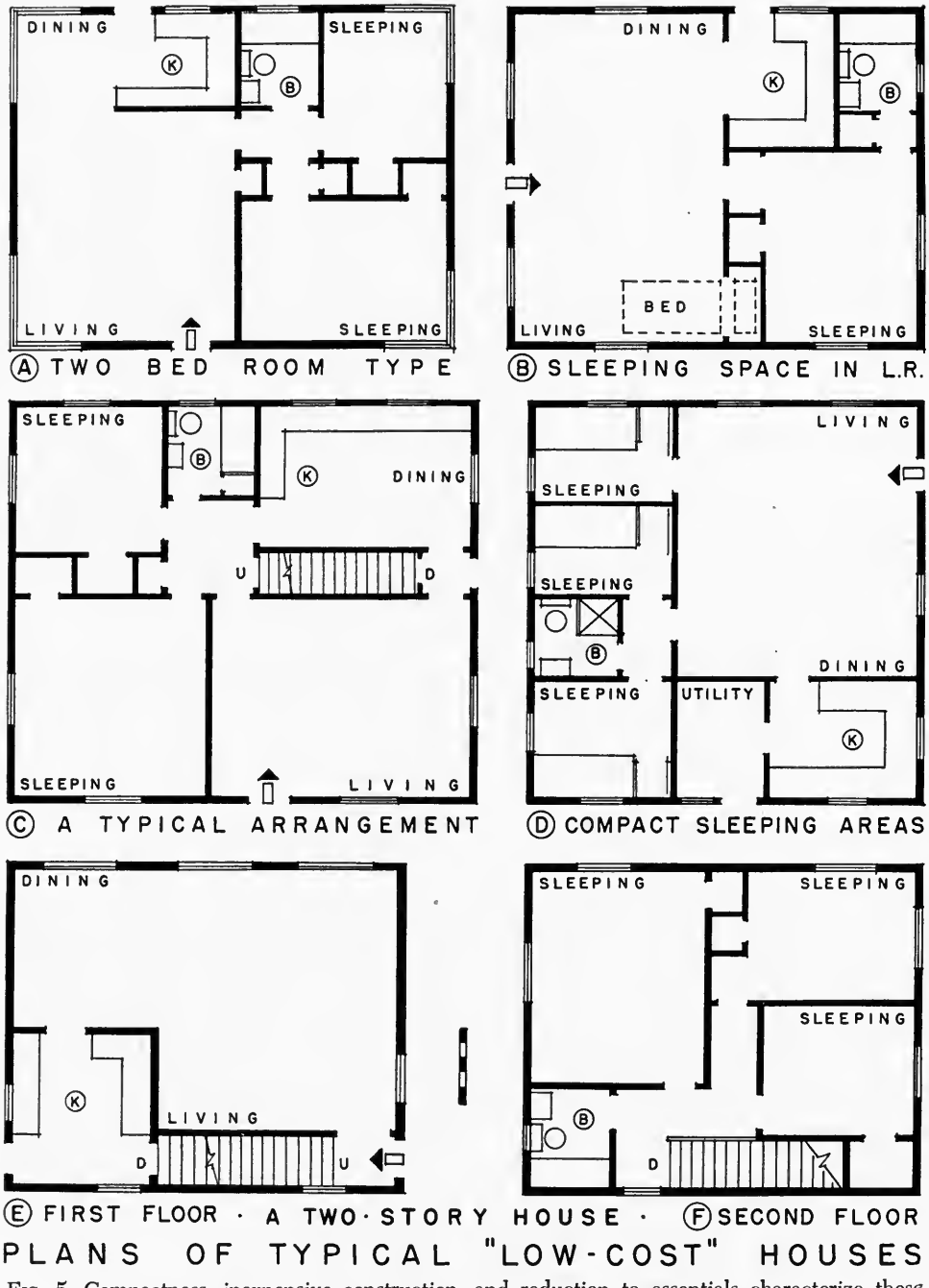


FIG. 5. Compactness, inexpensive construction, and reduction to essentials characterize these small homes, which represent the current answer to the demand for low-cost houses.

of custom-built houses. (See page 61.) Successful building of prefabricated houses depends upon:

Satisfactory use of materials, both old and new.
Efficient and economical manufacturing methods.
Rapid assembly on the site.
Coordination of construction and acceptable appearance.
Durability equal or superior to custom-built houses.
Reduced costs.

Whether prefabricated houses are built of wood, plywood, steel, or concrete, the item of cost is the factor which will do much to determine their popularity. The average owner is not greatly interested in the time of erection—he builds only one or two houses in his lifetime and does not mind waiting a few more weeks before moving into his home. If construction costs can be cut, not 10 or 15 per cent, but 30 or 40 per cent, then home builders in the middle- or lower-income brackets will be interested in prefabrication. The cost of prefabricated houses can be reduced materially only through mass production, which in turn depends upon demand. There is a demand for low-cost houses and, while the prefabricated house is at least a partial answer, on the whole, this vast and profitable field still challenges the ingenuity of manufacturers, builders, and architects.

The foregoing comments suggest a few of the possible methods which will assist the prospective owner of a single-family detached dwelling in his effort to build economically; but there must be a better coordination of the entire building industry including the related fields of real estate and financing, with their influence on land costs and interest rates, before much progress can be made in the direction of reduced costs.

Group Effort

In recent years low-cost housing and slum clearance have become synonymous in the public mind. However, "low cost" implies construction costs considerably lower than the average, and it is doubtful if this is characteristic of much of the mass housing directed by groups organized on a non-profit basis. While it is true that government-aided housing projects are built as inexpensively as material and labor costs and current management methods will permit, the actual cost per unit is usually almost as high as that in private industry. Even though building costs and rents are related, costs are likely to be secondary to rents—efforts to build in an economical manner are motivated largely by the necessity for minimum

Pease Woodwork Co.

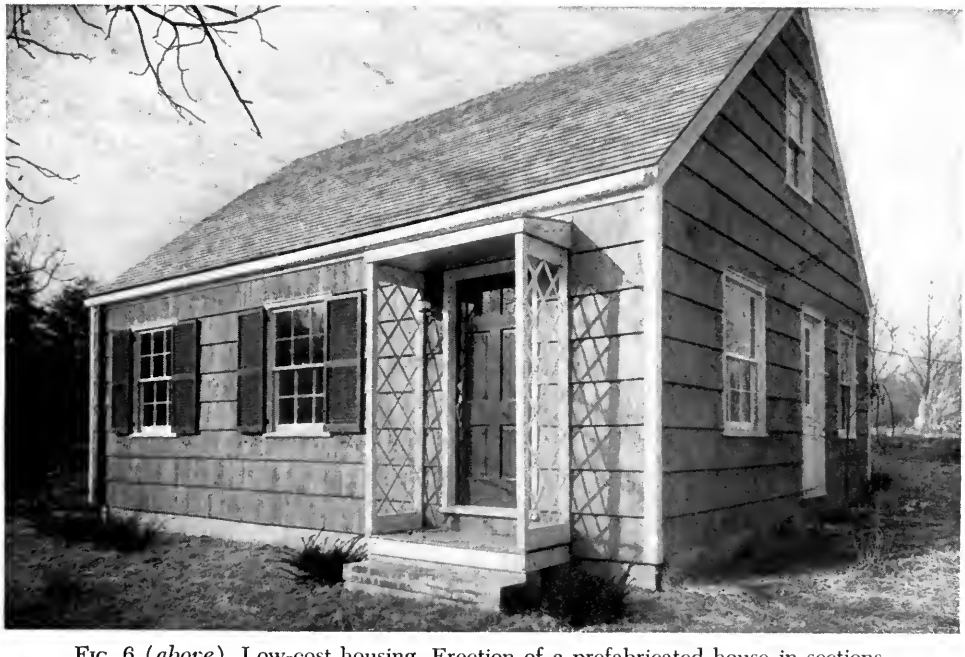


FIG. 6 (*above*). Low-cost housing. Erection of a prefabricated house in sections.

FIG. 7 (*below*). The completed house a few hours after work was started. A successful solution.

rentals. Instead of "low-cost housing," we actually mean "low-rental housing" for those with low incomes.

Regardless of the name by which it is known, the need for some considerable relief in this connection is urgent. The public generally has become aware of the fact that slums and blighted areas are an economic liability to the cities of our country—that the cost of the various services associated with police and fire protection, juvenile delinquencies and adult crimes, spread of disease, and other social problems demands a remedy for these evils. Always there is present the financial aspect—the lack of proper food, clothing, and shelter due to maladjustments in our economic system. Low-cost, or more correctly, low-rent housing, is, therefore, identified with those families in the low-income brackets, those, who, through their inability to maintain proper standards of living, tend to create blighted areas and slums.

Blighted Areas and Slums. It is difficult to formulate a concise definition for these two types of inferior housing. Human habitation may pass through three stages of deterioration, becoming an obsolete group, a blighted area, and an actual slum. In general, a blighted area is one in which the dwellings have become substandard but are still capable of being renovated and redeemed. A slum may be regarded as the last step in the decay of human habitation. Both these undesirable areas may be characterized by one or several of the various kinds of structures, as follows:

1. Substandard frame houses without modern conveniences.
2. Inexpensive subdivisions with poorly planned, closely spaced, and cheaply built houses which deteriorate rapidly.
3. Well-built, old houses, which have been rendered obsolete by improved standards in planning, construction, and mechanical equipment. If the environment is not undesirable, these may be remodeled and modernized as an alternative measure.
4. Buildings in the older part of the center of a city which have witnessed pronounced changes in character of occupancy. The original tenants have moved away and single-family dwellings on restricted sites have been made into flats and cheap offices and shops. These buildings are not adapted to their use, and overcrowding, low standards of living, and a slum condition result.
5. Long, narrow tenement buildings, with inadequate light shafts, which were built late in the nineteenth century. These structures represent some of the worst slums of our large cities.

In general, blighted areas and slums represent poor housing because of

1. Deteriorated physical structure.

2. Plan arrangements which are not conducive to satisfactory family life.
3. Overcrowding due to high rents and indifference to health factors.
4. Lack of fresh air, natural light, and sunlight due to poor planning.
5. Lack of adequate mechanical equipment, such as facilities for running water, bath tubs, laundry, flush toilets, and efficient heat and illumination.
6. Lack of play spaces and recreational areas.

Thus far the history of housing in both Europe and America has consisted of efforts to reach a compromise between individual enterprise on one hand and collectivism on the other. Unfortunately for the cause of free enterprise, low-rent housing has, as yet, been too complex and too unremunerative to attract private capital in any considerable quantity; and since housing of this type has become a national problem, the government has had to assume a major portion of the responsibility for providing decent habitation which may be rented to those families whose incomes are less than $1,500 a year. It is evident that, with present building and land costs and interest rates, those with $1,000 incomes which is probably an average for the families of this group—cannot afford to buy or build a home. For instance, if two and one-half times a yearly income is spent for a house and lot, only $2,500 is available for this expenditure, or $2,000 for the house and $500 for the lot. Generally speaking, satisfactory homes in this price range are still not available.

Steps in Housing. By way of a solution of this problem, housing agencies have been set up to study, plan, and administer movements which will secure group or mass housing for those who need assistance. Such agencies are usually composed of skilled specialists in the various related fields of architectural design, legislation, city planning, financing, construction, social research, and management. With the credit of the Federal Government at their disposal, they can coordinate all the various phases of housing the masses. Some of the steps necessary in a housing program are:

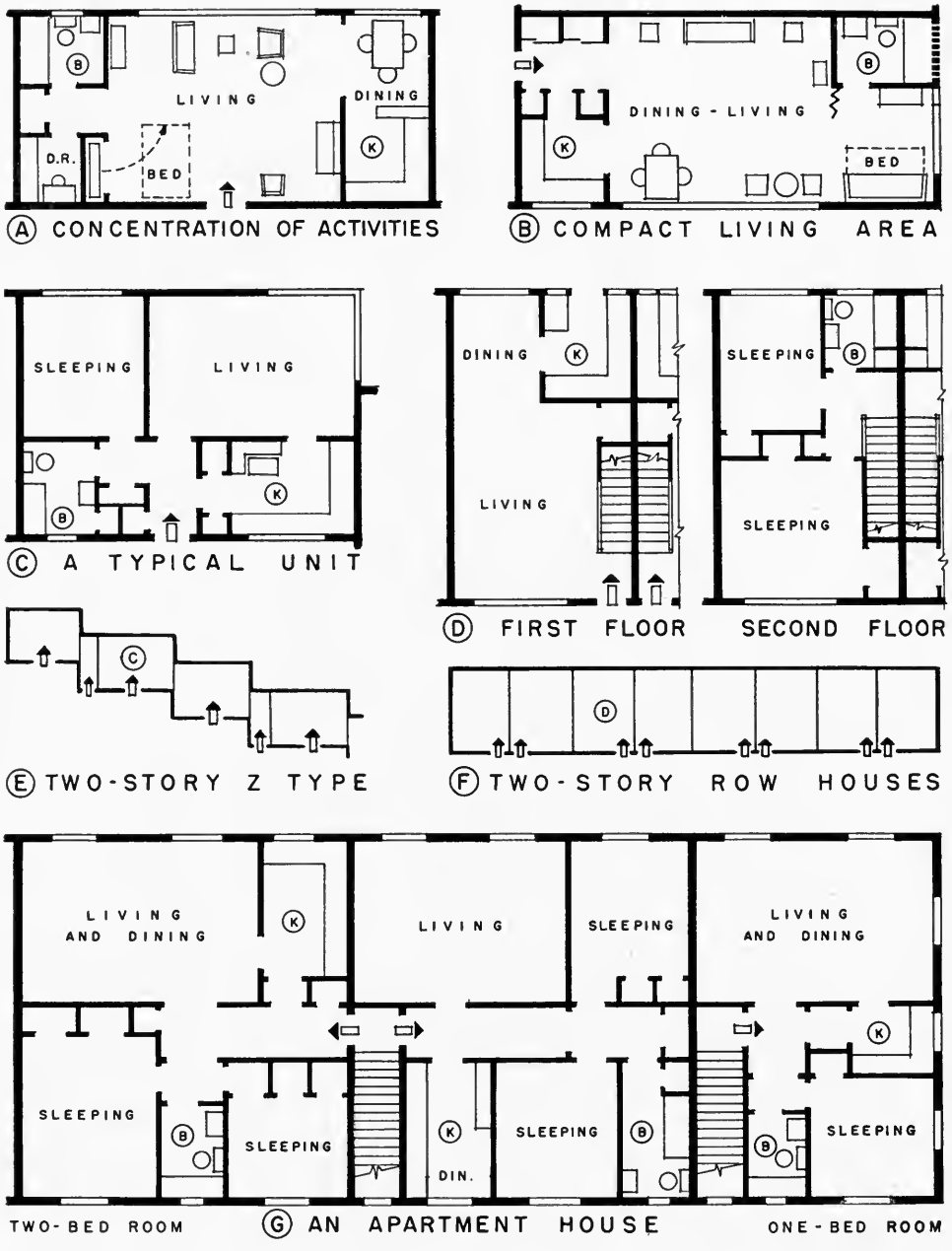
1. The passing of necessary legislation to give authority to the governing agencies and to make possible the acquisition of land by condemnation.
2. The selection of the site and the coordination of the occupied and open areas with streets, playgrounds, and public utilities.
3. The providing of temporary quarters for tenants displaced by a slum-clearance program.
4. The setting up of a financial program with long-term amortization and low interest rates, which will insure the lowest rents that will still meet the essential taxes and local charges.

5. The establishment of minimum, but adequate, standards of housing with reference to size, materials, and equipment.
6. The selection and education of tenants who will live intelligently in a type of shelter to which they have not been accustomed. This is a complex problem because of our many racial and cultural groups.
7. The development of a management scheme for the housing project in order to insure its normal life as a center for the improvement of family relations.

Architectural Considerations. Many of these problems are complex beyond inclusion in a book on the design of houses, but a few may be discussed briefly here. Since the cost of the site, the streets, and the public utilities will affect the rent, it is apparent that the initial cost of the land must be as low as possible and that considerable effort should go into "site planning." In many of the large-city projects it is necessary that the land be used as efficiently as possible to avoid extravagance in utilities and streets and at the same time to retain the maximum amount of open spaces for light, air, and play areas. Then there should be economical planning from the standpoint of simple construction, together with sound purchasing methods, and efficient supervision. The materials for exterior and interior surfaces should be selected with ease and economy of maintenance in mind. They should be permanent in character and pleasing in appearance. Also there should be a conscious effort to avoid a monotony in exterior design which might depress the occupants with its implied regimentation.

Some of the strictly architectural considerations in planning may be listed as follows:

1. Proper orientation to secure the maximum amount of natural light and sunlight.
2. The development of unit plans which lend themselves, with only minor modifications, to repetition.
3. The actual determination of minimum requirements and the coordination of these requirements with the various building codes and local ordinances.
4. The elimination of waste space and the securing of a compact plan with economy of circulation. The establishment of correct relationships between rooms and the working out of minimum but adequate room sizes. The design of satisfactory wall spaces for the necessary furnishings. These factors influence the success of an architectural setting as a scene of pleasant family life, and are discussed at considerable length elsewhere in this book.



EXAMPLES OF LOW-RENT HOUSING

FIG. 8. These dwellings, which, with minor additions in space and equipment, would bring higher rent, are, fundamentally, modified arrangements of several detached living units.

Locations and Types. The various low-rent housing projects may be located either in the center of the city, in suburban areas, or in the country. In the central part of the city is likely to be found the most urgent need for slum clearance. However, the site should be studied to determine whether it is a desirable location for a housing project. It may be that the environmental conditions which created slums in the first place will act in a similar manner upon new developments. Perhaps the land should be cleared and used for some purpose other than housing. New dwellings could then be erected on another site where there is more space, better air, and closer proximity to centers of employment.

Another factor which affects the use of sites near the center of the city is the inflated land value which has existed in the past due to the rapid expansion of our cities. The expense of acquiring this land and the wrecking of the slums must be borne by someone. The present owners will not, and the renters cannot, so this leaves a government subsidy as the only solution. However, land costs should be less in the future, for, with a decreased birth rate, fewer immigrants, less movement of population from villages to cities, and a tendency toward decentralization, there may be less demand for property on the fringes of our business areas.

However, if these central sites are to be used, the apartment-house building, often two or three stories high, or, with occasional exceptions, several stories high, will be the most prevalent type. (See page 96.) These apartments are usually built in congested areas, and are concomitant with the greatest density of population and minimum space for gardens and play areas. Apartments may be of the ribbon or strip type, one apartment deep, or T-, L-, or X-shape in plan, as shown on page 94.

In the suburban areas are to be found the small apartment groups and multiple houses. The latter, which are quite common, are simply a multiplication of single-family, two-story houses in groups of two to six to form a single building. These dwellings may be in the form of row houses, which are simply a row of ordinary two-story houses set side by side with common property walls and separate entrances, or groups taking on a zig-zag or Z-shape in plan arrangement. A group which is also finding favor in suburban developments has a single-story flat on the first floor with two-story row houses on the second and third floors. Another type is the flat which is a two-story apartment house, each unit with its own separate entrance or stairway, distinguished from an apartment which may share these circulatory elements with other groups. Subsistence homesteads and Greenbelt towns are typical of the low-cost housing projects which are built in the country. Again they may take on the character of group houses, as seen on

FIG. 9 (*above*). A slum-clearance project of the apartment type. Laurel Homes, Cincinnati.
FIG. 10 (*below*). Group houses in a suburban community development. Greenhills, Cincinnati.

page 96, or of the single-family detached house, usually with large plots of ground available for recreation or for vegetable gardens.

Sites and types should be selected with careful consideration for the types of people to be housed, their occupations and interests, the proximity of these sites to places of employment, and the adequacy, or possible development, of transportation, schools, and shopping centers.

Rentals. As a result of government subsidies, which often take care of the cost of land acquisition and construction, rents may be charged which are within the reach of all except those in the very lowest income bracket. For these individuals, still further aid seems to be necessary in accordance with local conditions and public opinion. The rents collected, averaging between $5 and $7 per room per month, meet the costs of taxation and operating expenses, and are naturally lower than those possible with unaided private capital. A survey of several typical housing projects shows that the average income of the occupants is approximately $1,000 a year and that a top limit of $1,500 is often set. The rents, which include heat, gas, electricity, and refrigeration, may be averaged as follows:

For two rooms	$15	per month
three rooms	$20	" "
four rooms	$24	" "
five rooms	$27	" "

These figures represent an average of about 22 per cent of the family income paid for rent, which is under the 25 per cent allowable.

For those projects which admit families with incomes as high as $2,000 a year, the rents may be summarized as follows:

For two rooms	$20	per month
three rooms	$25	" "
four rooms	$28	" "
five rooms	$35	" "

The average percentage paid for rent by these families is approximately 20 per cent of the yearly income.

The foregoing remarks represent only the briefest introduction to the problems of low-cost and low-rental housing and indicate the necessity of further and detailed study of their complex social, economic, and architectural features if anything approaching a comprehensive understanding is desired. This discussion has been included only to show the relation of low-rent housing to the entire subject of shelter and to point out that low-cost, inexpensive, and medium-priced houses themselves may be planned and judged architecturally by the same basic criteria.

Chapter 14

THE INFLUENCES OF THE COMMUNITY

By the time the average home owner has become affluent enough to build a home, the community setting has usually been rather definitely established by his work place, the adequacy of transportation facilities, and the ties of friends and relatives. However, in the large cities, there is often some choice between various suburban communities and it is desirable, therefore, at this early stage in house planning to study the influences which the immediate neighborhood and its related facilities may exert upon the location and character of the home.

The Urban Pattern. The average American community is a curious mixture of buildings grouped according to usage and the dictates of topography. A typical pattern has its central retail district with its fringe of small businesses and nondescript residential areas. Manufacturing is scattered along transportation lines while suburban subdivisions fill in the gaps and complete the fringe of the metropolis. The average city is complex, inefficient, and poorly planned. It was conceived in the horse-and-buggy days and is not adapted to modern transportation and modes of living. Its residential districts are composed of habitations of all kinds. There are single houses, double houses, multi-family houses, group houses, apartments, and flats. These may be arranged on streets laid out on the familiar and monotonous grid-iron pattern or on winding drives with pleasant views and changing vistas. The houses may be efficiently planned and beautifully designed or they may be inefficient and ugly. They represent the efforts of man to provide shelter for an urban population. The setting changes gradually as the size of the community diminishes, as we go from the city to the town, from the town to the village, and from the village to the country. Apartments and group housing disappear and single detached houses predominate. However, the same uncertainty about quality, efficiency, and appearance persists. Modern authorities on housing and house design are attempting to remove some of this uncertainty from home building.

The Rural Setting. The pattern of rural communities does not lend itself quite so readily to analysis as does the urban picture. Farm houses may be grouped close together to form a small settlement, or they may be scattered and isolated. Usually they are far enough apart so that they are not related to each other and exert little influence on their neighbors in the matter of design. So many rural houses are nondescript in arrangement and appearance and are so inadequately equipped that there is a greater need for study and improvement of them than of city dwellings.

Housing *versus* Home. It is evident that the problems connected with the housing of the nation are too complex and too numerous to be discussed in detail in one volume, so this book will be confined largely to the methods of securing a good solution for a single-family dwelling. The other phases of housing, while important, are often more closely related to social research, city planning, and mass production. We shall include only a brief analysis of subdivision development, garden cities, group or low-cost housing, and slum clearance. Each is a separate problem and is one to command the attention of many people, especially the architect, city planner, real-estate expert, social worker, and governmental agency. A large percentage of the people of this country live in detached houses and have as one of their fundamental ambitions the owning of their own home. It is to this vast army of people who expect to build or remodel and to those who may assist in this activity that this book is directed. However, the basic principles of planning to be discussed on the following pages are fundamental to all kinds of habitations. Apartments, duplex houses, or low-cost, low-rent group housing are simply variations of the single house. The same activities related to eating, sleeping, and recreation must be carried on regardless of the character of the shelter. In these multi-unit buildings, we find several complete living areas combined for the sake of economy in cost, maintenance, and responsibility. An apartment house is simply a correlated group of small and compact houses, each with its kitchen, dining room and living room, and bedrooms, as illustrated on page 94. Efficient planning and pleasing exterior design are just as essential here as in the single house. Therefore any discussion of the design of dwellings has direct application to all types of housing.

Community Characteristics

Climate affects architecture both in a general and a specific way, but the average architect, builder, or home owner is more directly interested in the actual physical setting of the house itself. It is necessary to select a site for the erection of the home, and this site may be in a community with desirable or undesirable characteristics or with both. These qualities may

be tangible or intangible; they may be based on facts and statistics or they may be more personal in nature, as the outgrowth of the owner's whims or fancies. All are important to the complete enjoyment of a home and should be carefully considered before the purchase of a site.

The Neighborhood. The average residential neighborhood in both large and small communities goes through several distinct stages of development in its life time. During the first, it is growing. Streets are being improved and houses are being built. Property is appreciating in value. It is the age of youth. The second state is reached when the neighborhood is built up and no more space is available. The community has reached a static condition. If the building has been done wisely, the homes retain their value for some time and may even appreciate, if periods of inflation occur. The neighborhood has reached its maturity. The third stage is the decline, when depreciation becomes more rapid. This is old age. It seems to be inevitable, but obsolescence may be deterred by good construction and design. Some neighborhoods become blighted areas almost as soon as they are built because of poor methods of building, cheap materials, and outmoded, ugly exterior treatment. However, there are many factors which hasten or retard the depreciation of a neighborhood. A few of the more important ones may be listed as follows:

> city planning, zoning, character of occupancy, topography, population trends, transportation facilities, conveniences, changes in methods of building and styles of architecture, technical developments.

In this connection, the following are some of the questions which the architect, builder, or prospective home owner should ask before a site is selected:

City Planning. Does the community have a city plan? Is there intelligent planning with reference to subdivisions, highways, parks, and playgrounds? The smaller communities are often the most negligent in such matters and are usually without much scheme for development.

Zoning. Is the city zoned to segregate buildings according to their use? Is the site under consideration located in the proper residential area? Is there likely to be any change in the zoning in the near future? If the district is surrounded by business or industrial property and is depreciating too rapidly, it may be on the verge of being rezoned. Such areas should be avoided for most single-family houses.

Deed Restrictions. Is the neighborhood protected by restrictions in the deeds of individual pieces of property? What provisions do they contain? Do they limit the location, cost, and style of the house to be erected?

Do these restrictions coincide with the owner's wishes and financial status, or will they hamper him in carrying out his plans? Sometimes such clauses are beneficial in establishing a certain uniformity of treatment in a street, but occasionally they are written in for the express purpose of benefiting a few.

Community Growth. Is the community growing rapidly, slowly, or not at all? Is there a movement of undesirable activities in the direction of the neighborhood? Does the community lie in the path of business or industrial expansion? Is it exposed to fumes, smoke, or odors? Is it protected by such permanent features as parks, boulevards, or rugged topography? What nuisance factors are likely to be conspicuous? If the property is close to railroad lines along which industry is spreading, encroachment is almost inevitable.

Character of Neighborhood. Are its physical characteristics desirable? Is its topography interesting or uninteresting; is the site easy or difficult to build upon? Are the streets narrow or wide, straight or winding? Do they carry heavy, fast traffic or little traffic? Are they noisy or quiet? Has the neighborhood reached its peak in development or is it growing? Is the character well enough established to become permanent, at least to last until rapid depreciation sets in? Is the architecture sound, simple, and sensible, or is it shoddy and sensational? Are the houses of a strictly traditional type among which a modernistic house would be too conspicuous? These are considerations which should influence the selection of a site and the kind of house to be erected.

Character of Occupancy. Are the occupants of the immediate neighborhood compatible in occupations, financial status, educational attainments, and social standards? Do they have similar or harmonious racial characteristics? Do they entertain similar ideas about community life and respect for others? Are they quiet or noisy? Are there many or few children and pets? While people need not and should not segregate themselves according to race, creed, or money, nevertheless a certain homogeneity in a neighborhood is desirable. A friendly, neighborly family may find itself on a street with those who may be inclined toward snobbishness, or a quiet couple unaccustomed to noise may discover that their new home is surrounded by energetic children and dogs. Or the family which tries to move in a certain social circle may be embarrassed by the homely and gauche activities of the neighbors. And the *nouveau riche* may be uncomfortable in the midst of those who place the emphasis upon intellectual achievements.

When selecting a neighborhood it is desirable to check on the possibility of imminent change in the character of occupancy. Just around the corner and unnoticed there may be a group belonging to an entirely different race and perhaps one with unassimilable standards of living. Most cities are making studies of the shifting trends in nationalities and classes, and it is often possible to secure this information. At least, the prospective home owner or house designer can look beyond the confines of the neighborhood itself. Depreciation may be hastened by the proximity of groups unrelated in modes of living.

Convenient Facilities. Is the neighborhood conveniently located with reference to transportation to school and work? Is it close to shopping centers and are they satisfactory in price and quality? Are there adequate provisions for recreation and entertainment? Is there street-car or bus service and can other parts of the city be reached easily by automobile over arterial highways which are close but do not pass through the neighborhood? Are the necessary churches close by or far away? Are there traffic hazards on the way to any of the daily activities? Many families have discovered that they have not planned intelligently for their interests outside the home, or that their interests have changed and the facilities of the neighborhood handicap them in the performance of necessary tasks.

Public Utilities. Is the neighborhood and especially the individual site provided with the necessary utilities, such as water supply, sewage disposal, electric light and power, gas, telephone, paved streets, police and fire protection, and garbage collection? These necessities are so often taken for granted that sometimes a home owner discovers that some of them are not available after the building site is already purchased. Someone skilled in such matters should make a check and determine their presence, adequacy, and cost.

Taxes. Are the taxes excessively high and could they be avoided by building just outside the corporation line? Are there special assessments for paving, boulevard lighting, or other improvements?

The foregoing questions indicate physical characteristics of a community which should determine the selection of that neighborhood and the kind of house to be erected. Climate and topography influence the design of a house while the environmental qualities of a chosen community help to modify it. These factors form the physical background for the evolution of a home. The manner in which the people live in this community produces the social environment which conditions domestic architecture still further.

These questions should also help focus attention upon the importance of community development to form a setting for the home as the scene of family life. Satisfactory progress in the growth of a modern efficient city will be made only when individual home owners realize that their dwellings are a part of a larger organization. Individual citizens should learn to look beyond the confines of their own front yards and to see their houses as they are related to the neighborhood scheme, to the city plan, and finally to the regional pattern. Everyone, whether home owner or renter, should be interested in such pertinent subjects as zoning and subdivision regulations, traffic improvement, transportation facilities, sewage disposal, restoration of blighted areas, slum clearance, housing developments, modernization of building codes—in short, all phases of city and regional growth. All these factors affect the design of shelter either directly or indirectly and cannot be ignored if a community is to be properly housed.

Some of the more visionary authorities interested in urban development insist upon group rather than individual planning—upon the need of designing an entire community at one time rather than the inefficient building of single, isolated dwelling units. Many abuses have appeared with the uncontrolled growth of small subdivisions and unrelated houses. Too often their location is contrary to sensible community expansion and does not provide for the proper utilities and conveniences. The houses themselves are inharmonious in appearance, and, being built singly or in small numbers, are more expensive than is desirable.

It is far better to approach the problem of housing in a more comprehensive way and to guide the process of decentralization which is taking place in our metropolitan areas. Instead of building unrestricted, heterogeneous houses, architects and city planners are now visualizing complete communities which are homogeneous and self-sufficient. These satellite suburbs are scientifically planned, with parks, drives, schools, churches, shopping centers, recreational facilities, and harmonious homes set in adequate natural surroundings. In them a progressive community spirit, stimulated by a well-planned neighborhood, fosters congenial family life in efficient and orderly homes. Narrow streets and lots, inadequate transportation and shops, careless construction and design produce congested, ugly, noisy, and inconvenient neighborhoods. In such a setting a satisfactory single house loses much of its effectiveness. To counteract this, a truly modern community ideal should precede the erection of separate dwellings. Shelter for living should be, first, communal and encompassing and, second, individual and personal.

Chapter 15

THE INFLUENCES OF THE SITE

The Lot

Before an architect, designer, or prospective home owner goes very far with the planning of a house, he is faced with the realization that a definite building site must be selected. A similarity in character should exist between the lot and the house—a similarity which was discussed in Chapter 9 as desirable between the dwelling and its occupants. The site should be in sympathy with the personality of the house, as

a city street for formality,
a rolling area for informality,
a steep hillside for forceful massing.

It should also be located so that the particular type of house may have harmonious neighbors. A picturesque cottage would be incongruous in the midst of stately Georgian mansions.

The site will have physical qualities, such as size, shape, and surface peculiarities. All these should exert some influence upon the general design of the plan. While it is possible to eliminate some of the most undesirable characteristics of a site by grading, filling, and the placing of the house, this work may be expensive. It is often cheaper and the results more interesting if some of the characteristics of the lot are allowed to affect the plan.

Size of Lot. Let us, first of all, examine building sites with reference to size. One of the unfortunate practices of real-estate procedure is the custom of selling property according to the cost per front foot. Our older cities have streets which have been laid out on a grid-iron pattern with a regularity deadly in its monotony but lending itself to easy computation of price on this long-established basis. Fortunately recent theories of city planning encourage "garden cities" with winding streets and adequate play areas. This arrangement results in irregularly shaped lots which do not permit such a direct application of front foot costs. But these suburban

developments are as yet in the minority and, on the whole, the old idea of property being sold and taxed according to the frontage on the street is still with us; and houses remain crowded together on narrow lots. Building sites 50 and even 40 feet wide are the rule in the less expensive subdivisions. Let us consider a typical lot, which is 50 feet wide and 150 feet deep. It has an area of 7,500 square feet. If the depth is cut to 125 feet, which is ample, and the same area is maintained, the width will be increased to 60 feet. The space between the houses side to side will be greater while the distance from rear to rear will still be enough to maintain privacy. If the lot were sold according to the price per square foot instead of price per front foot, the cost for the 60-foot lot would be the same as that of the 50-foot lot. But as long as narrow lots exist we must plan for them.

As a rule, a narrow lot requires the placing of the narrow end of the house toward the street and the running of the long axis of the house at right angles to the street. The bungalow type of one-story house has been developed for lots 40 and 50 feet wide. The living room usually extends across the front, behind which are two bedrooms and a bath on one side and a dining room and kitchen on the other. This has become a stereotyped and unimaginative arrangement, belonging to the front-porch era. A more recent and interesting version of a one-story house for a narrow lot is to be found on page 106. The plan shown here has all the advantages of the earlier type as far as compactness is concerned and provides a better setting for modern ways of living.

The two-story house may be made to fit a narrow lot in a satisfactory manner as is illustrated on page 106. It will be noticed how the combined living and dining area occupies the minimum width while the entrance hall and the kitchen have been fitted into place in a very compact manner. The garage is behind the kitchen and faces toward the rear. It also helps to screen the outdoor living terrace from curious neighbors on one side, and careful planting of shrubs will do the same on the other side.

Unfortunately not many solutions are so successful as those in which the shape of the house fits the shape of the lot. Human nature and the blind following of custom have dictated that the greatest dimension of the house should face the street. People want their houses to look as large as possible. They usually consult their local building ordinance, place their foundation lines as close to their property lines as they are permitted, and proceed to build. The result is crowding and lack of privacy. One radio will suffice for three houses!

It is found that standard widths of those sites which are larger than the minimum vary from 60 to 80 to 100 feet. These lots will accommodate

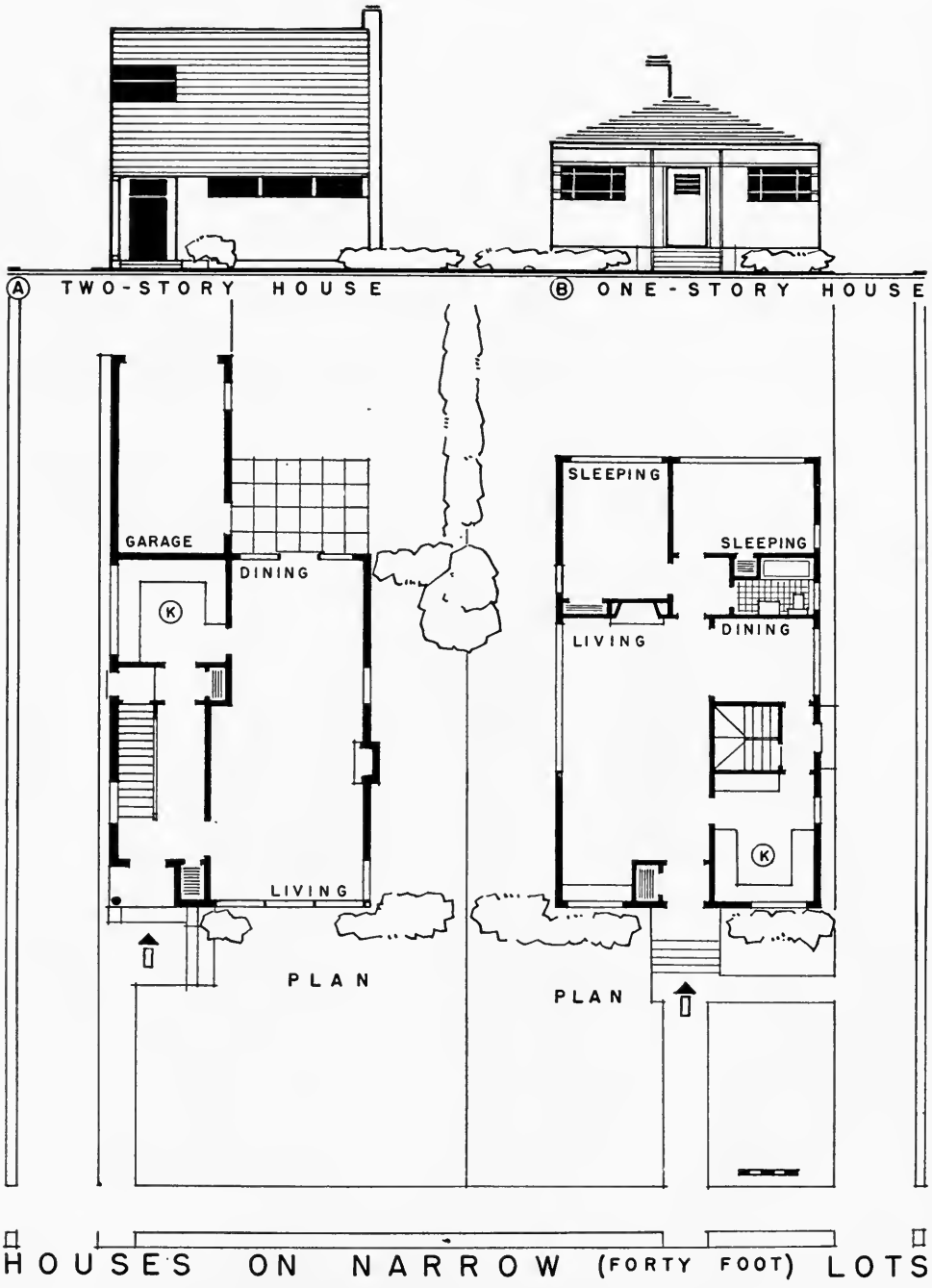


FIG. 11. There is a sympathetic relationship between the shapes of these plans and the lots. The plans are long and narrow, to insure maximum space between the houses.

larger houses and will permit greater variations in plan arrangements. But even with this increased area, the building public does not take full advantage of its opportunities. The desire for recognition (see page 9) is always strong, and people like to spread their houses out parallel to the street and make a $10,000 house look like one which would cost $20,000. Too many of our houses are stage sets—all front. Privacy is thus sacrificed, and living porches, at the sides instead of at the rear, are only a few feet from the neighbors' kitchens. Judicious planning can adapt a house to a lot to maintain the necessary appearance and retain the desirable privacy.

The drawing on page 108 shows a compactly arranged house placed on a wide lot. Some people do not like to have the garage facing the street because, if the doors are left open, the sometimes unattractive interior is revealed to those who pass. Here the garage faces toward the side and may be screened from the neighbors by correct planting. The long lines of the house are legitimately placed parallel to the street, and the composition of the plan has other features which would not be possible on a narrow lot.

Shape of Lot. It is quite obvious, in looking over the residential sections of almost any city, that the simple, rectangular lot is the most common as far as shape is concerned. This is especially true of those communities located on the plains, where the directions of streets are not interrupted by changes in topography. It is probably easier to plan for and to build on a rectangular lot, but the results are usually more orthodox. The unusual lot and the unusual house often go together. The regularly shaped lot seems to call for a straight-forward solution without the obvious tricks of composition which are sometimes perpetrated in the name of informal planning. Irregular arrangements with the various wings of the house turned at angles to each other should be reserved for irregularly shaped lots; otherwise the results may seem forced and artificial. If the lot is peculiar in its outline, this quality should be allowed to influence the shape of the house, as on page 110. Here the bedroom wing of the house has been turned so that it is parallel with the left-hand property line and so that its direction is harmonious with this boundry of the site. This arrangement allows for larger outdoor area behind the living units than would otherwise be the case. It will be noticed that the front façade of the house follows the direction of the curve of the street, with the garage projecting toward the rear behind the main body of the structure. Other characteristics of building sites may be capitalized upon to the advantage of the general design of the dwelling. In fact, this is much more desirable than trying to force a "stock" plan on a "special" lot. A regular house on an irregular site may

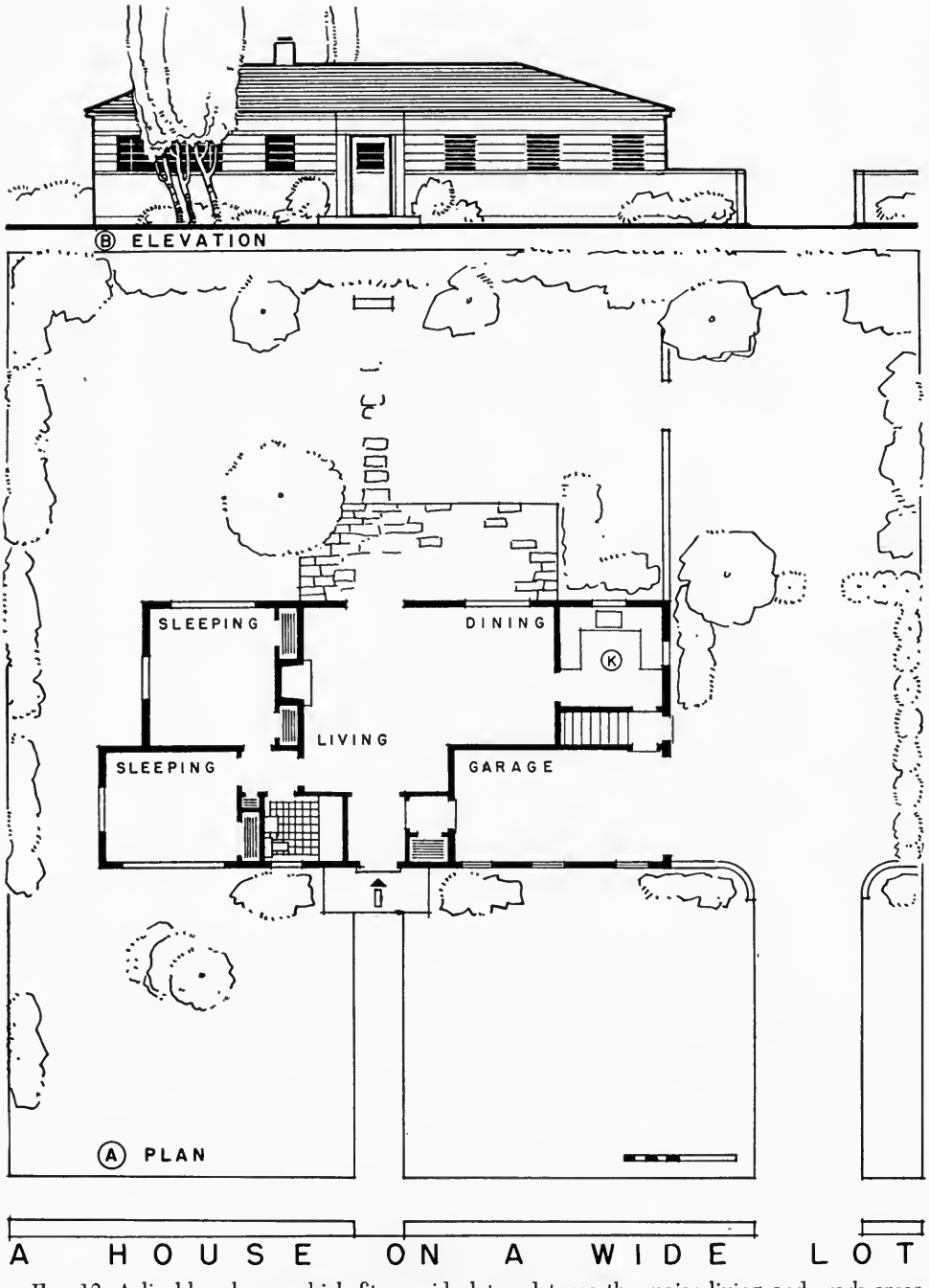


Fig. 12. A livable scheme which fits a wide lot and turns the major living and work areas toward the garden in the rear. The garage doors face a court which is screened from view.

result in a lack of harmony between house and site and in unpleasant massing and proportions.

Contours of Lot. Much has been written about the influence of topography upon domestic architecture. It is usually to the effect that houses of the prairie states should be low and horizontal in mass and treatment to harmonize with the sweep of the plains and that those built in the hills should assume outlines similar to the more rugged terrain. It is unwise to make such dogmatic statements, for architecture might thus become monotonous—a minor evil, or even wrong—a major fault. Let it simply be said that, on the whole, a level site should produce a house which is simple in its massing and arrangement of levels. In their efforts to do the unusual, house designers sometimes attempt to introduce different floor levels between the principal rooms, a practice which, at its best, does not make for economy of circulation. For the sake of economy of space, garages are often placed in the basements of houses on level lots. Both of these situations are out of place here and should be reserved for sloping lots, if they are thought necessary. Garages in the basements of houses on level sites necessitate unsightly deep holes and expensive retaining walls which tend to offset any financial saving connected with such an arrangement. While we are talking about garages, let us point out that the locating of a garage on a lot which is high above the street level may also result in deeply cut driveways. The problems thus presented are difficult of solution and are best solved by someone experienced in planning.

While level lots are no doubt the most popular and common, still sloping sites are not undesirable. In fact, they are often the most productive of interesting houses. This is especially true if the lot slopes toward the rear in such a way that the house can be placed at the point where the change in grade occurs. Advantage of this irregular contour can be taken in two ways, with several variations of these themes. The house may be entered at a point about half way between the two floors, with the living quarters at grade on the lower level, and the sleeping units on the upper floor. Another scheme calls for a more orthodox arrangement of rooms, with the usual first floor on the same level as the front of the lot and the second floor above as in the average two-story house. This means, then, that there is a basement, or ground floor, at the rear which is well lighted and above grade. This can be used for a game room, auxiliary living area, built-in garage, or other features considered necessary by the requirements of the family. This arrangement is illustrated on page 130, where a porch opens off the recreation room, above which are a terrace and living room.

When the lot slopes toward the rear rather abruptly, the living and dining

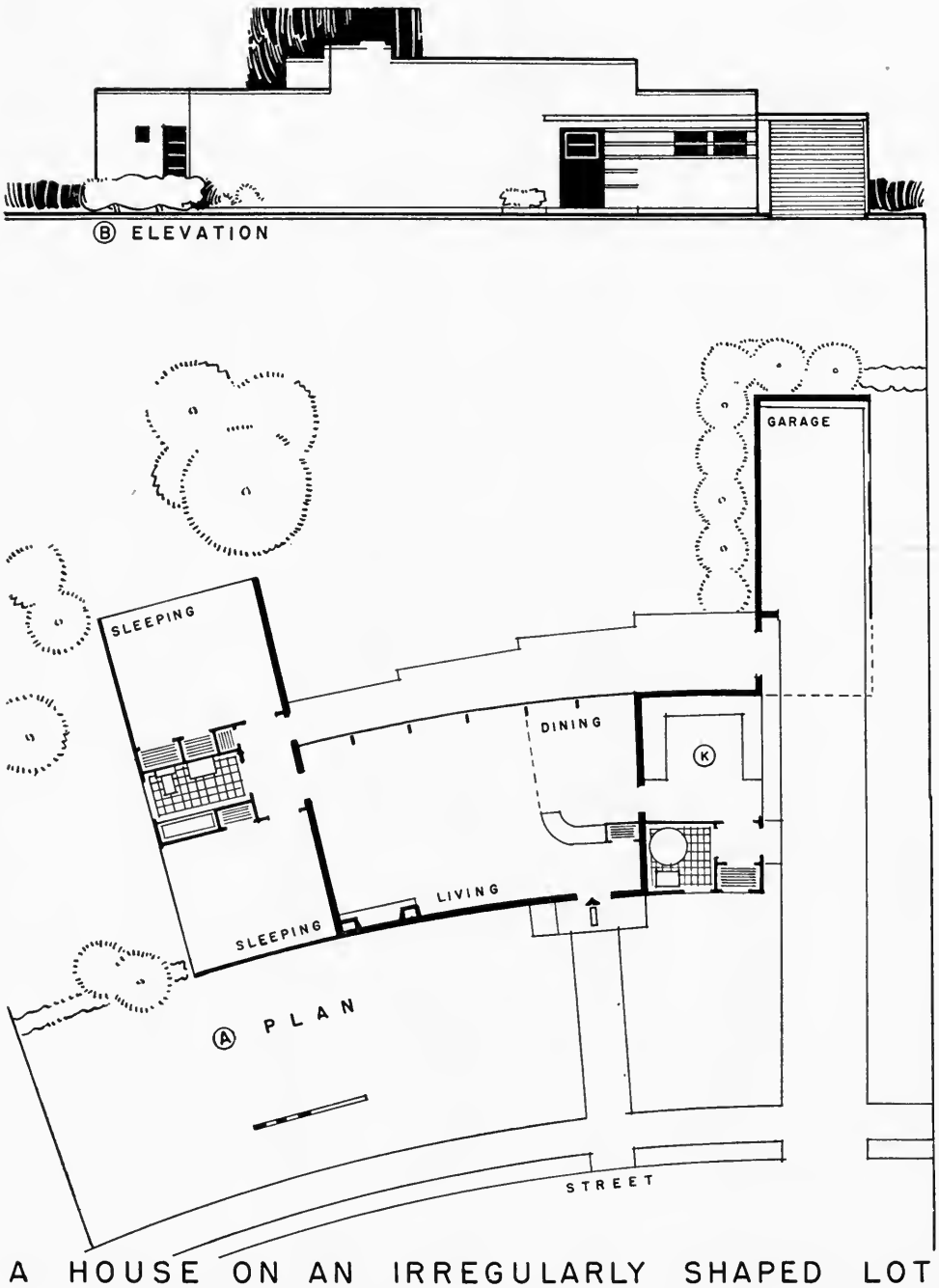


Fig. 13. A non-traditional type of house which is related to the boundaries of the lot. The shape of the plan insures privacy for indoor and outdoor living and emphasizes the garden vista.

areas seem to be most satisfactorily placed at the rear facing the slope and taking advantage of the view. The kitchen is thus kept at the front of the house with its service entrance easily accessible from the street. It is also usually wise to place the house so that its main lines are parallel to the contours of the lot, for in this way a similarity and harmony of height may be maintained. However, it is not desirable to make very many definite statements about the influence of site upon the plan. Each lot requires special study, but the designer can at least cooperate with the site instead of combating it.

If the lot slopes from the rear to the front, the problem is not quite so easy of solution as in the former instance, and the results are likely not to be so satisfactory. The matter of grading, retaining walls, and drainage from the rear toward the house are important items for consideration. A possible solution calls for the kitchen and dining room together with service facilities to be located on the first floor facing the street. This means that the bedrooms will probably be located on the second floor front, while the living room will be at the rear and open out on the higher level of the lot.

If the building site slopes with the street across the front of the house, there may be changes in level to follow the general contour or the garage may be placed in the basement facing the street as in the home shown in Fig. 81.

Location of Lot. Much depends upon whether the lot is an inside or a corner lot. Most sites have houses on either side, which may affect the location of the house on the lot and the orientation of the rooms. The corner lot presents a slightly different problem because the designer has the influence of two streets to consider.

A corner lot permits greater latitude in plan arrangements and in the placing of the house. The plan on page 112 shows how advantage may be taken of the two streets. The garage and service entrance face the minor street at the side, while the front entrance faces on the main thoroughfare. This house may be placed on a shallow lot which has its longest dimension parallel to the major street, and the house and its landscape development may be adapted to this situation. Or the lot may be orthodox in shape, as illustrated, with the living and dining areas turned toward the garden in the rear, and with this outdoor area properly screened from the public by the planting. The plan of this house is well adapted to the peculiarities of either lot.

Orientation. This important subject concerns itself with the placing of the house with reference to sun, winds, trees, and street. In recent years

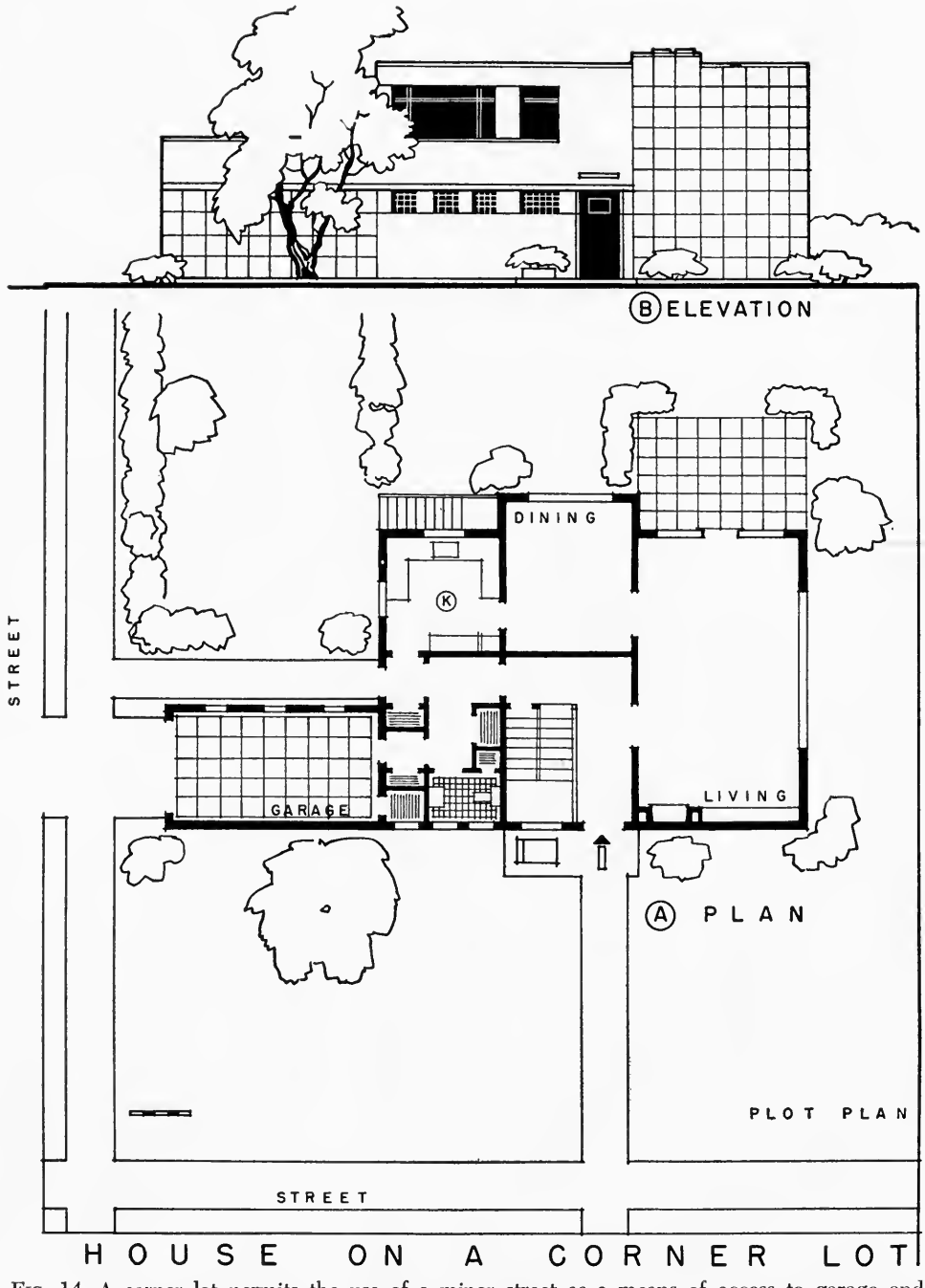


FIG. 14. A corner lot permits the use of a minor street as a means of access to garage and service entrance, leaving the front yard free from such undesirable features.

a number of rather arbitrary rules have been laid down and generally accepted as desirable. However, it is far better to examine each individual case in the light of its geographical location, climate, and the habits and opinions of the family.

Since the sun contributes so much to our daily existence and pleasure, it has long been customary to place the important rooms on the south side of the house. Until recently the living room was almost invariably located at the front of the house together with the porch. The desirable building lots were thus on the north side of the street so that the house faced south. Now with the front porch era passing into a decline and with the living room moved to the rear, lots on the south side of the street with the house facing north seem to be more in demand. But every one cannot live on the south side, so that for the remainder the question of orientation is even more complex.

It is not only because of the sun that the south seems to be a more desirable exposure, for in many parts of the country the prevailing summer breezes come from the south or southwest. Sun and breeze together constitute a strong drawing card for a southern exposure. On the basis of this condition, it is possible to list the preferable locations of the major rooms of a house as follows:

Rooms	On the
Living room	south or east
Porch or terrace	south or east
Dining room	east or southeast
Kitchen	east, northeast, or north
Study	may be placed on west
Major bedrooms	south
Minor bedrooms	may be on west or east

It will be seen that western exposures are avoided and are indicated only for those rooms which are less important or which may be used in the evening after the hot summer sun has gone down. Since quite obviously some rooms must be placed in some undesirable location with reference to sun, breeze, or street, it is necessary that there be compromises. Rules of orientation are made only to be broken. Families may have their own individual and peculiar reactions to the elements of climate. Some people prefer hot weather and brilliant sunshine. Others are always searching for cool retreats and subdued light. Therefore the peculiarities of the site and the idiosyncrasies of the occupants should be adjusted on the basis of common sense and not by dogmatic conceptions.

If prevailing breezes are from the southwest in the summer and the living room is placed to take advantage of them, this part of the house will receive the full heat of the afternoon sun. There must be a recognition of this condition and some kind of compromise reached unless the house can be placed so that it will be shaded by trees in the afternoon. If the living room is on the west or northwest and is partially shaded by tall trees with their lower branches high above the ground the low late afternoon sun will reach this part of the house during the long summer evenings when it may be the most used. It is evident that in many parts of the country the summer sun is not regarded as a friend, but is something to be kept away from and out of the house. It generates too much heat and glare and it fades the housewife's rugs and draperies. On the other hand, the winter sun is usually a desirable visitor, especially in the cities with their smoke-laden skies. The less traditional styles of archtiecture permit the use of a projecting cornice or louvered canopy which will be placed so as to permit rooms with southern exposure to receive the benefits of the sun when desired. In summer, the angle of the sun's rays is more vertical and the projection will keep them away from the windows. In winter, the sun travels a lower path and its beneficial rays reach the interior of the living areas. A scientific study of the position of the sun during various hours of the day and months of the year will reveal other desirable situations and factors.

Breakfast rooms on the east are quite cheerful in the spring, fall, and winter, with the morning sun giving warmth and color to the morning meal. However, they are likely to be hot and uncomfortable in the summer, unless they are shaded in some manner.

There is little doubt that an eastern or southeast exposure is a desirable one for a formal dining room. A room of this character is probably used chiefly for the evening meal, and in the summer the hot sun is at the west at this time and its influence is no longer felt.

Living porches are to be found on the south in many cases. They are thus delightful in the spring and fall and on summer evenings, but, in the Middle West, they are likely to be too hot for use on a summer afternoon. North porches are usually shaded and may be cool on this account. But they are also shielded from the prevailing southern breezes and may be uncomfortable for that reason. Porches on the east seem to be very desirable.

Bedrooms on the south and west receive the benefit of the cool breezes at night when they are most needed but they also bear the brunt of the summer sun's hot blasts most of the day. In a like manner, second-floor

terraces opening from bedrooms may be so placed that they absorb and radiate quantities of heat and often prove to be a liability instead of an asset. If the bedroom is moved to the east side of the house, it may escape the afternoon sun but will not receive the benefit of the evening breeze. The early morning sun may also prove to be an unwelcome visitor for the late sleeper.

It can thus be seen that orientation is a matter for individual consideration, for, in addition to the influences of climate and topography, the matter of view, trees, adjacent houses, and street must be taken into account. The house shown on page 315 is placed so that the living areas may be secluded and faced toward the view at the rear. The house is also located so that the existing trees may be saved in order to protect it from the effects of the summer sun. The various rooms are placed according to what seems to be the best current practice, with the less open sides of the living room and porch turned toward the afternoon sun and the major bedrooms toward the southern prevailing breezes.

The character of the street is also an important influence upon the placing of the house and the location of the different rooms. Is it a noisy or quiet street? Is there a great deal of traffic and if so, when does it pass? Does it come at dinner time and if so, should the dining room face the street? Is traffic heavy in the evening just when family conversation or informal entertaining is taking place? Traffic may thus indicate the desirable location of the living room. If the street is a leisurely, neighborly one, perhaps living room and porch should have a portion facing toward the street so that the natural curiosity of people about their neighbors may be satisfied and so that the household can thus keep in touch with its neighbors' daily doings. If the street is noisy and if the people who pass are strangers, then perhaps the family may want to turn its back and develop its interests around indoor and outdoor living areas at the rear.

The relation of the house to the street may be dictated by subdivision restrictions. Some require that all the houses on the street be placed a uniform distance from the sidewalk. This may result in monotony, but monotony is so often characteristic of our architecture and furnishings that it has almost become a national characteristic. There is even monotony in the garish variety of our suburbs. People feel safe in building and living like their neighbors, and a sense of security is thus fostered (see page 8). If there are no restrictions, the placing of the house should depend upon the depth of the lot, the amount of garden or lawn desired at the rear, the location of the living units, and the general size and shape of the house itself.

Chapter 16

RELATIONSHIP OF PLAN UNITS

In developing a plan, it is necessary to proceed from the general to the particular. Before the specific details of individual rooms can be worked out, a study must be made of the placing of these rooms and their relationship to each other. Kitchens, dining rooms, and living rooms may be well planned as separate units, but unless they are located correctly in the general scheme they will not form a satisfactory house. We are, then, first of all, interested in the various factors contributing to the development of a plan which is fundamentally sound in its basic arrangements.

Someone has said that architecture, to be completely satisfactory and useful, should have

utility, stability, and beauty,

and this is just as true of houses as it is of office buildings or city halls. In this chapter we shall emphasize utility, in Chapter 35, stability, and in Chapter 31, beauty.

Houses should be, first of all, utilitarian. They must serve their occupants in a satisfactory manner, which perhaps may be accomplished by a careful study of

function
circulation
flexibility
zoning

Function

The house is such an old form of architectural expression that practice and usage have established certain fundamental relationships between rooms that enable them to function adequately. Kitchens are usually adjacent to dining rooms, dining to living rooms, entrances to stairways, and bathrooms to bedrooms. Future practice will probably not vary much

from these traditional arrangements, but the methods by which these combinations are secured may result in new forms of expression. A couple of generations ago the kitchen was not so close to the dining room as it is today. The modern exhaust fan had not been developed to remove the odors of cooking, and distance had to serve until science could come to the rescue. With the servant problem not as acute as it is today, this distance was no particular burden to the housewife. With changing economic conditions, the kitchen and the dining room have been drawn more closely together, until now dining has crowded into the kitchen and has become definitely established in the form of pleasant nooks. Dining has also pushed its way, none the less determinedly, into the living space, garbing itself in new clothing and assuming some of the character of its new environment. We should, therefore, study accepted relationships of rooms in the light of contemporary thought and use.

Plan Organization. A synonym for design is organization. When one designs, he organizes. He gathers together all the essential but unrelated parts of an object—whether it is a story, a symphony, a painting, or a house—into a related, unified whole. It is not enough simply to put a number of rooms together according to use and to assume that good architecture will result. The proportions of the areas, spaces, volumes may be awkward, and the resulting exteriors may be unpleasant. There should be a dominant idea, and all the contributing parts should be built around this center of interest.

Before proceeding further with our discussion of planning, let us develop a method of study. We may do this in a visual manner which is understandable and usable by amateur and professional designers alike. First, the designer should decide in general what size the proposed house is going to be, basing the decision upon the number in the family, their interests, and their financial limitations. (See Chapter 9.) Then a list should be made of the major rooms and their approximate sizes. A recent survey made of a number of typical inexpensive and medium-priced houses shows desirable sizes and actual relationship of sizes of various rooms and units, as tabulated on page 118.

After approximate sizes are established, a study should be made of the probable effect which the site may have upon the general scheme. All this information should be listed on a piece of paper so that these requirements may be available during the development of the plan. Pieces of heavy cardboard should then be cut out to represent the various rooms, at a scale of ⅛ or ¼ inch being equal to 1 foot. These pieces should be colored in some distinguishing way, as green for the kitchen, yellow for the dining

Areas	Percentage of total floor space		Desirable sizes
	Two-story, three bedrooms	One-story, two bedrooms	
Kitchen	9	9	9 ft. × 12 ft.
Dining room	11	10	12 ft. × 14 ft.
Living room	21	30	14 ft. × 22 ft.
Bedrooms	35	32	12 ft. × 14 ft.
Bathrooms	8	6	6 ft. × 7 ft.
Lavatories			4 ft. × 5 ft.
Closets	4	4	2 ft. × 3 ft. 6 in.
Stairs	12	9	3 ft. or 3 ft. 6 in. × 12 ft.
Halls			4 ft. wide in addition to stairway; 4 ft. or more without stairway
Garage	not included		one-car—11 ft. × 20 ft. two-car—18 ft. × 20 ft.

space, red for the living area, blue for the bedrooms, black for the bath, orange for the stairs, and purple for the garage. Planning may be begun by putting the pieces together in as many different combinations as possible, keeping in mind such items as desirable relationships, orientation, and influence of site. As this is done, interesting shapes, arrangements, and solutions will present themselves and the designer will be able to visualize a building developed from one of these plans. This is the beginning of design. It is planning, either for yourself or for your client. It is not buying a stock house or copying one out of a magazine. It does not insure good architecture, but, if done intelligently, it is a step in the right direction.

After the designer has secured a general scheme which seems to meet the requirements, small pencil sketches may be made. He may draw the first ones freehand, trying out both floor plans and a front elevation or perspective in order to check the horizontal arrangement of units against the exterior treatment. Other studies, on thin tracing paper so that the designer may profit by the previous sketch underneath, may be made more accurately with T-square and triangle at perhaps ¼-inch scale. These studies may show

the location of doors and windows and the placing of furniture, which will give a satisfactory idea of the way in which the house will function as a shelter for family life.

Represented Plan. It is sometimes difficult for amateur designers to visualize the meaning of a plan drawn on paper. In order that we may be talking the same language, let us examine a represented plan and see what the various symbols mean when they are used by the architectural profession. A plan is a horizontal arrangement of rooms, grouped together on one or more floors. In order best to understand what a plan is, let us imagine a model of a house built of material capable of being cut easily. If, with a sharp knife, a horizontal slice is made through the model on a line a short distance above the window sills, the upper part of the model may be lifted away. If we look directly down upon the part remaining, we shall see the cut walls which enclose areas or rooms with the doors and windows showing as openings in the walls. If, with a soft pencil or ink, we draw heavy black lines to represent these walls, indicating the windows with thin lines and the doors as blank spaces, a represented plan will result, as shown on page 122. This diagram is a plan reduced to its essentials and will suffice for the present. As this plan is developed in an architect's office, various symbols are added to indicate the direction of door swings and stairs, the location of light switches and plumbing fixtures, and the nature of the various materials. The simple sketches are thus developed into working drawings from which the house is finally built (see Chapter 10).

Circulation

It is not possible to talk about desirable relationships of rooms without discussing circulation, for it is probably the most important requirement in architecture. No matter how well paintings are hung in a museum or dresses are displayed in a shop, both buildings will fail to function adequately if it is difficult for people to walk through them easily. In a house, as elsewhere, circulation is conspicuous by its presence or absence. If we can go quickly and directly from one part to another and if we do not encounter too much furniture on the way, it is possible that the circulatory routes have been well studied. Correct relationships imply good circulation but do not guarantee it. Much depends upon the design of the individual rooms, the location of doors, the direction of the door swings, and the grouping of furniture.

Factors. Rooms should be regarded as spaces or volumes, but they are usually represented in plan upon paper as two-dimensional rectangles. It is

necessary to have communication between these various areas, and openings or doors must, therefore, be located. The correct placing of these doors is an important contribution to easy circulation. While openings should not encroach unduly upon the wall space which is so necessary as a background for furniture, a caution of equal importance concerns itself with proper location with reference to circulation. After the openings are shown on the plan, the necessary thought should be given to the direction of the door swings. Carelessness in this connection may result in an endless source of annoyance. After the room is entered, in which direction will most of the traffic go, to the left or right? The function of the room and the position of the major groups of furniture will afford the answer to this question. The door should be hinged on the left if the main portion of the room is to the right or if a person normally turns in this direction, or on the right if the reverse is true. Common sense is perhaps more important than rules—door swings should expedite and not hinder circulation.

Entrance Hall. Circulation may logically begin at the entrance hall and evolve from and revolve around this unit. The hall often serves as a tie between the various rooms—it is the hub of the wheel and the rooms are the spokes. When planning, we have two options in this connection. The various doors of adjacent rooms may lead into this hall, as all the railroads of France converge in Paris, or there may be secondary paths of circulation around the outskirts to supplement the arterial highways. It will be noticed in the plan on page 126 that the location of the doors contribute to easy circulation from room to room.

In most two-story houses the stairway is a part of the entrance hall. As a rule, it is not desirable to locate this element of vertical circulation so that it is necessary to enter or cross the living room in order to reach the second floor. This unfortunate arrangement brings into a recreational group those individuals who are not participating in that particular activity; it often eliminates privacy and increases confusion. The entrance hall and its stairway should usually be located near the center of the house so that all the rooms may be reached with the minimum number of footsteps. It should be large enough to prevent congestion, but not so large that it is uneconomical of space.

General Circulation. After we leave the hallway, we should look for easy communication between the major rooms of the first floor and then for the same situation on the second floor. We shall leave a study of circulation within the individual rooms for discussion in a later chapter, but we should, at this time, scrutinize the various floor plans in order to find ways of ar-

riving at a desirable scheme of general circulation. The proposed plan layout should be made upon paper, with room areas and their doors carefully shown. Dotted lines should then be traced, as on page 122, showing the paths which various members of the family would have to take in performing such routine acts as

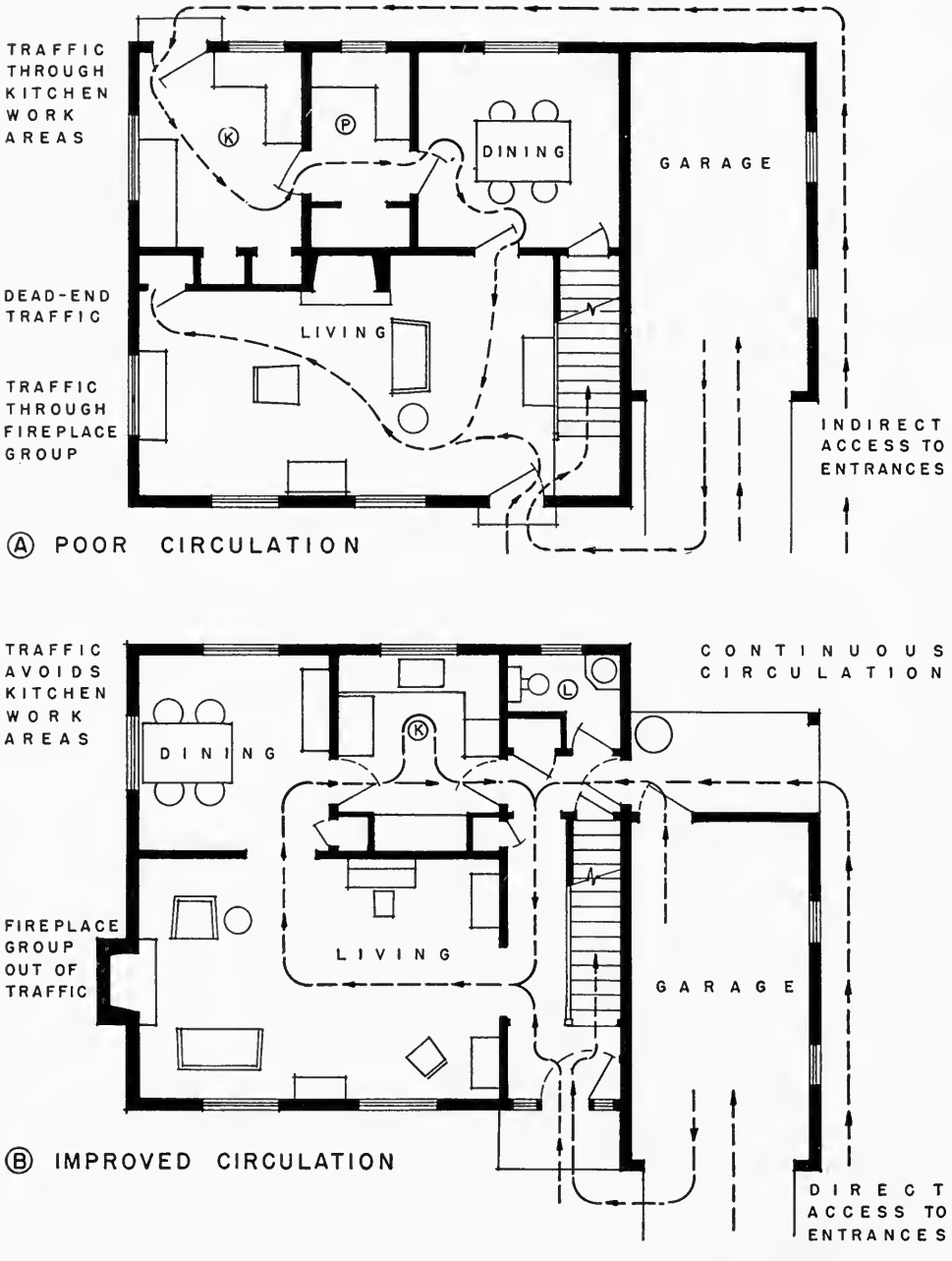
1. Answering front door bell from the kitchen.
2. Carrying food to the dining room from the kitchen.
3. Going from the living room to the kitchen.
4. Reaching the second floor from various parts of the first floor.
5. Going from the kitchen to the porch for outdoor dining.
6. Going from a bedroom to the bathroom.
7. Going from the front or rear entrance to the coat closet.

A successful interpretation of good circulation will depend upon the answers to these typical questions:

1. Are the above routes short and direct or lengthy and winding?
2. Do they pass through portions of rooms where circulation is not desired?
3. Do necessary furniture arrangements interfere with easy circulation?

The two plans on page 122 show good and bad circulation. In Fig. 15A the location of the doors and door swings interfere with easy circulation. The furniture and the fireplace are poorly located. The kitchen is a considerable distance from the front entrance and from street service. Communication between the garage and the house is awkward. These faults have been corrected in Fig. 15*B*. Circulation throughout the first floor is direct, while the kitchen may be reached quickly from the street. There is easy access from the garage to the side entrance with its coat closet and lavatory.

Fatigue. The word circulation has a connotation of movement. This movement may be in connection with work or play—it may be dull and uninteresting or pleasant and interesting. Economy of movement is desirable in either case but is especially worth while if associated with work. Fatigue results from work activities, and circulation should tend to minimize unnecessary motion. If time and motion studies could be made for all the typical home activities for the various members of the family, it would be possible to classify in a sequential manner the circulatory routes in the order of their importance. Such a procedure would be difficult of accomplishment and would vary with the interests of different families. There would be different results for the housewife, the husband, and the dependents, and such a study would be further complicated by the presence



PATHS OF CIRCULATION

FIG. 15. Dotted lines show most commonly used circulatory routes. The continuous path in *B* is more desirable than the dead-end and indirect circulation illustrated in *A*.

of servants and the changes in daily routines. However, it is obvious from a casual survey that, for the average family, the heaviest traffic flow for most members is between the kitchen and the dining room or the dining and living rooms, and the lightest is probably between the entrance and the bathroom. For the sake of brevity, the amount of traffic, in an average home, in order of amount and importance may be summarized as follows:

1. Between kitchen and dining room.
2. Between dining room and living room.
3. Between bedroom and bath.
4. Between kitchen and living room.
5. Between kitchen and bedroom.
6. Between kitchen and front entrance.
7. Between dining room and bath.
8. Between entrance and living room.
9. Between entrance and bedroom.
10. Between living room and bath.
11. Between entrance and bathroom.

It is obvious that these movements are affected by the size and plan arrangement of the house and must necessarily vary with the physical setting. It is, therefore, suggested that a check be made of the major activities of the family which is to occupy the house in an effort to ascertain which paths of circulation are the most used and how they can be made direct and effort-saving.

Flexibility

This term is applied to an object which is pliable and yielding—not stiff. With this definition in mind, it may be a little difficult to see how the word could be associated with houses, because the materials of building are, on the whole, rigid and unyielding. We are, however, not talking of the physical structure but of the plan arrangement and the uses to which the various rooms are to be put. Flexibility is desirable and necessary because of the need for compactness and efficiency and because of the restrictions imposed by financial economies. If we could build as completely as we should like, giving little thought to cost and upkeep, it would not be necessary to design a room so that it would serve two purposes. Flexibility means that a plan arrangement is not stiff and uncompromising. It means that it can be adapted to the changing needs of a family and that a single room can accommodate more than one activity. Flexibility makes possible the multipurpose use of rooms.

Flexibility is desirable because of the need for:

1. Compactness
   because of the high cost of land.
   because of the necessity of good circulation.
2. Economy
   because of the high cost of building per cubic or square foot.
3. Maintenance
   because of the smaller number of rooms possible with a flexible plan.

Activities. A few years ago little intentional thought was given to the multi-purpose use of rooms. People sometimes ate in the kitchen, but a kitchen was a kitchen, a dining room was a dining room, and a living room was nothing but an orthodox living room. But we are using houses differently from the people of a generation ago. The functions of rooms have changed and will probably change even more. Here is a list of some of the activity areas which now overlap:

cooking and dining
dining and relaxation
dining and play
dining and study
relaxation and study
sleeping and study
sleeping and relaxation

These overlapping arrangements are necessary also on account of the conflicting interests of the different members of a family. If only one or two people were occupying a house, little difficulty would be encountered because there would not be more than one or two activities taking place at one time. But with several individuals trying to study, play, converse, and operate the radio simultaneously in a small, compact house, flexibility of use is essential if family life is to be congenial. It means that bedrooms, dining rooms, and other areas must be designed so that they may be used as auxilitary centers for entertainment or study. A dining room which is occupied only a couple of hours a day for the consumption of food and, by reason of its shape, location, and equipment, is not suited to any other function represents architectural space poorly adapted to effective use. Flexibility can be secured by

1. Location of activity areas.
2. Design of individual units.
3. Type of furniture and accessories.

Location of Areas. It is, of course, essential that areas which are related to each other in use should be adjacent. If the designer contemplates the inclusion of a breakfast bar where hasty snacks may be consumed, as shown in Fig. 38*F*, it is necessary to have a general scheme which can be adapted to this particular arrangement of the kitchen. If the dining area is to serve the double purpose of dining and entertaining, this area must be placed and treated so that it may, on short notice, change its identity from one to the other. A center hall between the dining and living rooms eliminates much of the possibility of flexibility in this connection. Each room is segregated and its activities limited. If there is to be a small study, library, or quiet room which can be combined with the living area for the more ambitious types of entertaining, this purpose must be kept in mind when room arrangements are being studied. The plan illustrated on page 126 combines several of the features which have just been mentioned. The dining space is an alcove which belongs to the general recreation area. It can be screened from the main living space upon occasion and can become part of it when needed. The dining table can be small for family meals or can be extended to any reasonable limit for party gatherings. This alcove can be used for study or games not wanted in the other portion. It will be noticed that the small study at the front of the house can also be made a part of the center for recreation when the number of guests and the character of the gathering demand its use for this purpose.

Design of Individual Units. It is in the design of the various rooms themselves that the greatest opportunities occur for the achievement of flexibility. For instance, kitchens may be laid out to include breakfast nooks or lunch counters, as on page 181, while a space before an interesting window at one end of the living room may be a dining area for a couple of hours and a place for reading and conversation the remainder, as in Fig. 23*A*. A guestroom on the first floor may be used as a quiet room or study, while its accompanying bath may serve as the family lavatory. These ideas may be expanded in many directions and are limited only by family needs and the ingenuity of the designer.

The plan which lends itself best to flexibility is the so-called open plan which is typical of certain phases of the contemporary movement. A house of this kind is conceived as having rigid, permanent exterior walls but with the interior walls less well defined and the activity centers more fluid in character. This is contrary to the philosophy of those who want things to "stay put" and who prefer definite and tangible lines of demarcation between areas. Various methods of arriving at a truly flexible plan have been suggested, most of them depending upon new uses of old and new

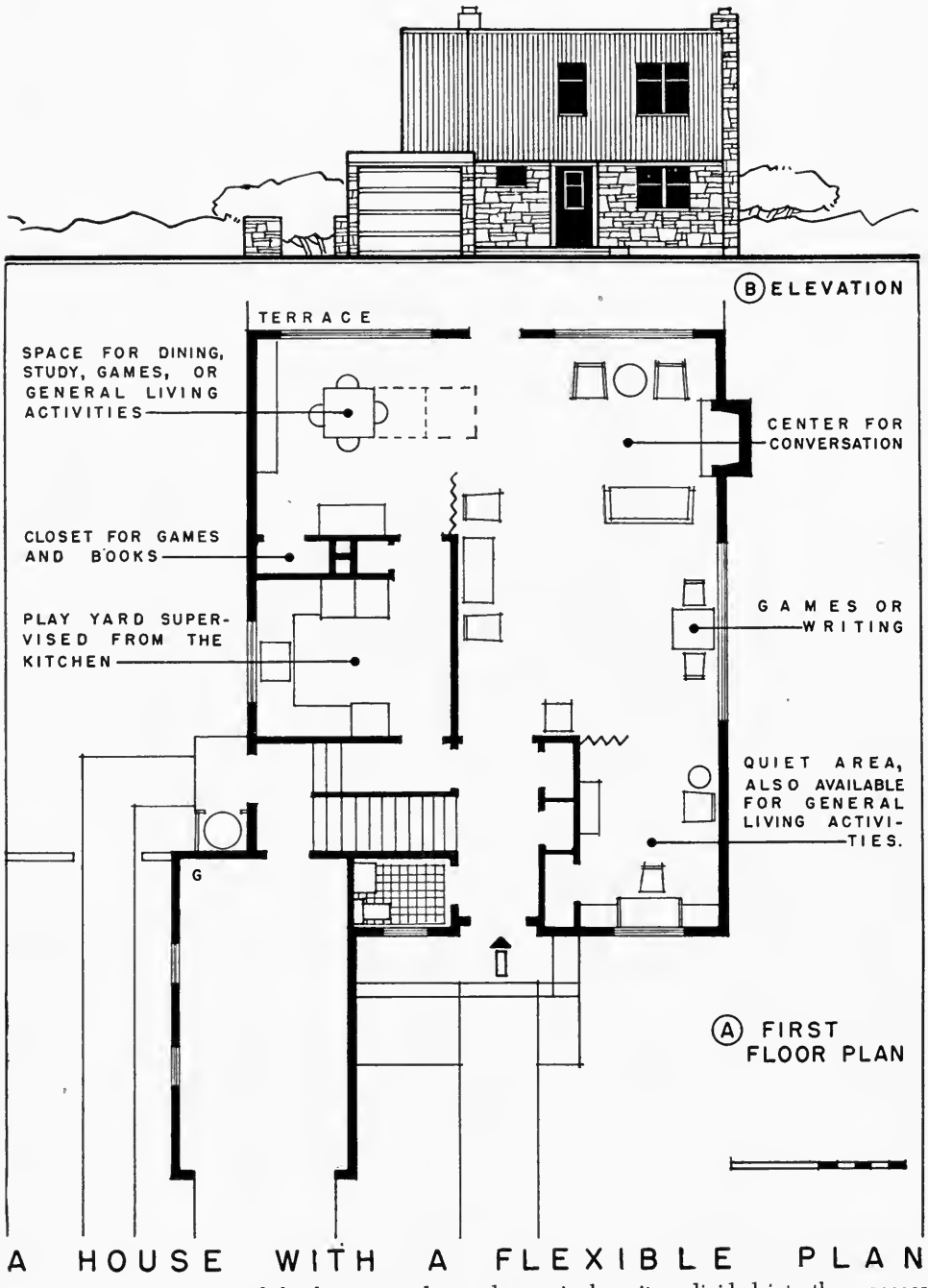

B ELEVATION
TERRACE
SPACE FOR DINING, STUDY, GAMES, OR GENERAL LIVING ACTIVITIES
CENTER FOR CONVERSATION
CLOSET FOR GAMES AND BOOKS
PLAY YARD SUPERVISED FROM THE KITCHEN
GAMES OR WRITING
QUIET AREA, ALSO AVAILABLE FOR GENERAL LIVING ACTIVITIES.
G
A FIRST FLOOR PLAN
A HOUSE WITH A FLEXIBLE PLAN

FIG. 16. The living area of this house may be used as a single unit or divided into three spaces for divergent types of activities, either quiet or active—dining, conversation, games.

materials and a more complete mechanization of the home. Usually such rooms as the kitchen, bedrooms, and bath are separated from other areas by permanent partitions, but the remainder of the house may be divided by partial walls, folding walls, sliding doors, movable screens, heavy fabrics, glass panels, and built-in furniture. The smaller and more inexpensive houses do not lend themselves to this type of arrangement, but in the medium-priced homes it is possible to achieve many interesting and workable combinations by the use of the previously mentioned architectural elements. A large living area may be divided into units for conversation, reading, and soft music by means of furniture, screens, and moving walls and remain capable of being thrown together for the accommodation of parties and receptions. A plan of this type is illustrated in Fig. 18*D*, where the spaces for dining, relaxation, and study may be well defined or may merge into a unified area for occasional demands.

Furniture and Accessories. The contemporary attitude toward furniture has changed from that of a generation ago. Comfort and appearance are being combined to create new forms which are better adapted to modern living and to flexibility within the individual rooms. If a room is to be used for more than one activity, it must be equipped with that requirement in mind. If a separate and distinct dining room is desired in the house and if it is to see service more than just the two or three hours a day for dining, a compromise must be reached with reference to the furniture. If the room is to be used at times for child study or family games, the table should not be too susceptible to mars and scratches and the chairs should not be too stiff and uncomfortable. In addition to the regular furniture, perhaps the dining room should have an easy chair with a radio and magazines close by or it might include a desk and chair for correspondence and for going over the monthly bills. Adequate closet space should be provided for the room as a place to keep books and games which are used in this area, as shown on page 126. There is nothing more deadly than a stereotyped, unimaginative dining room which loudly proclaims that it exists chiefly for show and that informal dining and a pleasant family life are incidental.

If dining is to be carried on in one end of the living room or in an alcove opening from it, the furniture should take on the character of the living area rather than that of the customary dining room. A gate-leg table, which may become a place for a lamp and books after mealtime, together with interesting, comfortable chairs, makes one of the many possible combinations in this connection. Or built-in benches, upholstered in gay fabrics or

serviceable leather, and a table to match may be used for meals and also provide a space later for a game of chess or for homework.

If the living room is large enough, separate areas for the less noisy activities may be established by the placing of the larger pieces of furniture and the judicious use of screens and curtains. It must be remembered that no amount of planning can eliminate the conflict between noisy and quiet activities unless they are definitely separated by walls. The living room should, generally, be reserved for the medium activities—not for the boisterous or for the quiet. The former belongs out of doors or in a recreation or playroom; the latter should be moved to a separate study or perhaps to the dining room or bedroom.

If desired, bedrooms may be used for activities other than sleeping and dressing. With the inclusion of the necessary furniture and the provision of the proper wall space, a bedroom may take on some of the character of an upstairs sitting room or even a study. The wishes and interests of the occupants are the only limitations placed upon the possible character and use of bedrooms, as well as other areas in the house.

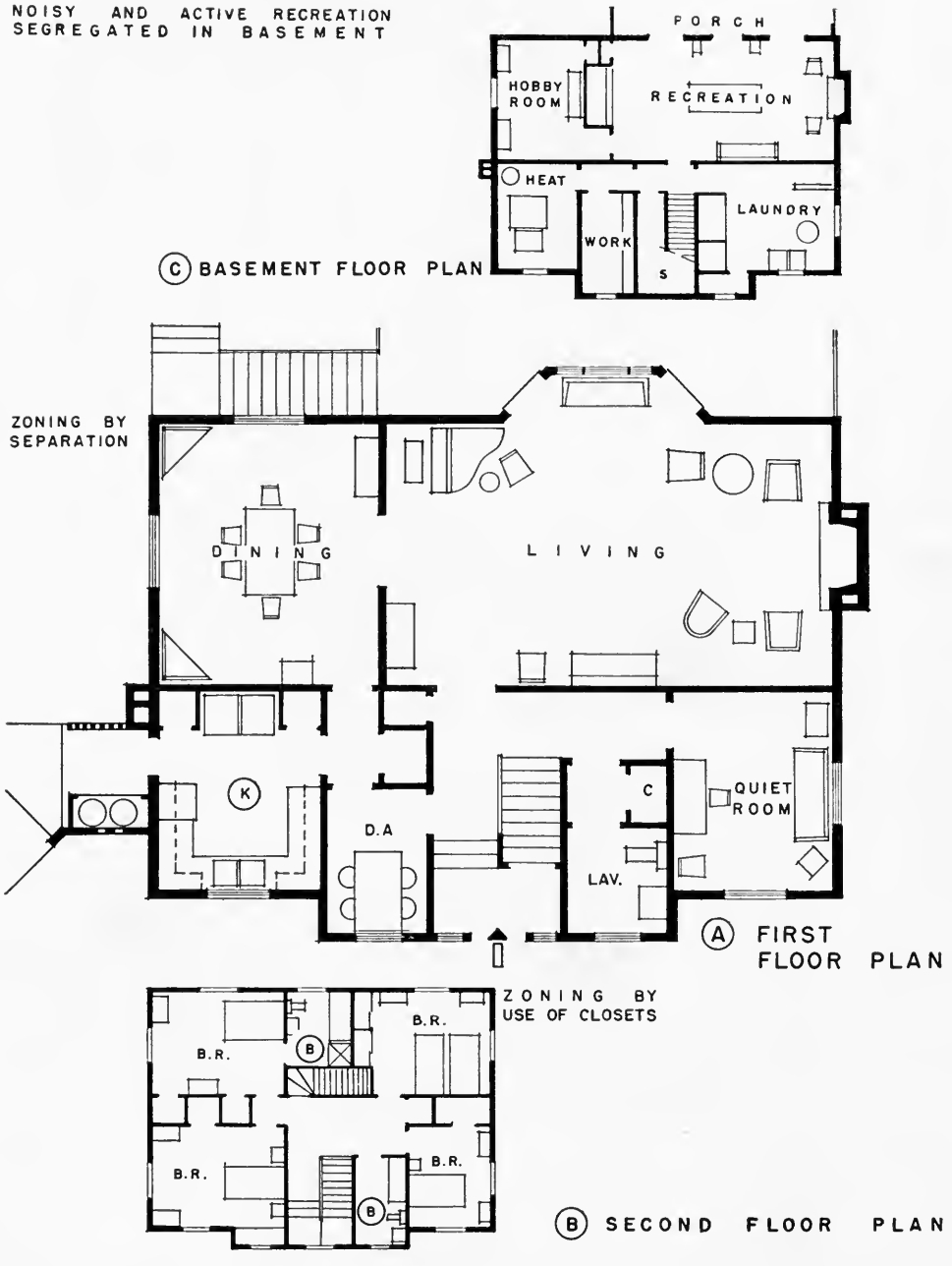
Comparisons. In general, the traditional styles of architecture are less flexible than that which is currently called the functional or modern. This is especially true of those types based upon the Renaissance, namely, the Georgian, Colonial, Italian, and French. Even though modern usage has modified the plans of these historical styles, there is a limit to which changes can be carried without too much loss of the original character. The houses based on these periods have rather definite shapes, sizes, and treatment as far as plan is concerned, and, while the modern designer takes many liberties with his sources of inspiration, still he must exercise considerable restraint when working with stylistic architecture. So often traditional exterior treatment demands a regular spacing of doors and windows, and the interior walls must therefore be placed in accordance with these openings. On the front façade the windows often have to be the same size and character regardless of the rooms in which they occur. For the sake of balance, the windows in bath, lavatory, or kitchen are identical with those in living and dining rooms, which presents difficult problems in connection with the placing of interior fixtures and the selection of curtains and hangings. Nothing is more ridiculous than the often-seen garage windows on the front of the house draped with lace curtains to match those of an adjoining dining room! When exterior openings control the location of interior walls and the size and shapes of rooms, that is architectural design working in reverse. It is planning from the outside *in* instead of from the inside *out*. A flexible, functional plan, adapted to daily living,

should dictate exterior treatment. The exterior should grow logically from the horizontal arrangement of units.

This does not mean that traditionalism must be entirely eliminated from the flexible plan. On the contrary, in the hands of a skillful designer, many of the details and desirable characteristics of the stylist types of treatment can be retained in an efficient modern house for those who like the association with familiar forms. But the keynote of the "functional" house is flexibility in planning. The designer is not hampered by traditional spacings, proportions, and groupings. He has entire freedom in his arrangement of rooms into various types of plan compositions and he can develop satisfactory combinations based entirely upon the influences of site, costs, and the requirements of the occupants. While his work in planning room arrangements and exterior treatment is easier because of freedom from restrictions, still this very freedom reacts to the disadvantage of the less experienced designer, who can no longer borrow from the stock plans and familiar details of the past. He must create new plans and exterior forms, depending upon his knowledge of the principles of plan composition and exterior design to secure a workable plan and a pleasing combination of solids and voids, of areas and volumes, of light and shade, and of detail and color. The truly flexible house is more desirable from the standpoint of convenience, comfort, and interest, but its conception and execution require a more complete understanding of the creative principles of design.

Zoning

Just as a city is zoned into residential and business districts, so a house should be divided into areas definitely assigned to various dissimilar activities. This may seem in contradiction to the idea of flexibility and perhaps it is to a slight extent. But one must recognize that there are some home activities which will not mix. Not only must they be separated from each other but it is desirable to have some kind of insulating medium between in order to insure complete isolation. As we have already indicated, any activity which is characterized by noise and movement is the greatest offender of peace and quiet in the home. Sound and motion usually accompany each other, although sound may come from a motionless radio and rapid walking through a room may be comparatively noiseless. When a person is trying to study or a group is attempting to converse, any other activity is likely to be disturbing. But which type of activity has the right of way in the home? Perhaps it depends upon the personality of the family. If it is normally a quiet one, noise and confusion are unwelcome. However, if one member's inclinations do not agree with the others, he should have



A HOUSE ZONED FOR VARIOUS ACTIVITIES

FIG. 17. Various living activities are separated by definite barriers, but good circulation is still maintained. Other views of this house may be seen in Figs. 35, 68, 112, and 117.

a place in which to express himself. If the family is a noisy and exuberant group, any dissenting member should not have to conform to a pattern but should have a retreat to which he can go when he so desires.

Methods. It is, of course, easier to provide zoning in a larger house than in a very small one, but some measure of success can be achieved in this direction even in the more modest homes. It will require thought and study, but, unless zoning is considered, the house may not be entirely satisfactory as a background for family life. Zoning may be secured by several of the following typical methods:

1. Provide a recreation room in the basement.
2. Plan some kind of playroom on the first floor, which may be multi-purpose, serving as an area for games, auxiliary dining, music, or entertaining.
3. Design the living room so that it is the recreation area and provide an adjacent quiet room for study, reading, and conversation. This arrangement might be desirable for the energetic family and for the housewife who does not take her household and entertaining duties too seriously. The fastidious housewife who likes order and neatness will probably not be in sympathy with this idea.
4. Provide a study or quiet room in addition to an orthodox living room.
5. In houses of any size, large or small, place such insulating elements as halls, stairs, and closets between noisy and quiet areas. Bedrooms are usually regarded as quiet areas and they should not open directly into the living area. Bedrooms should be separated from each other and from bathrooms by the placing of closets to deaden conversation and the noise of running water.

The house illustrated on page 130 contains many of the previously mentioned features. On the first floor, a quiet room is separated from the living area by a definite barrier. The lavatory is screened from the living room and the front hall. The noise and confusion of kitchen activities are removed from the proximity of the scene of relaxation, and also zoned from the dining room by the passage which acts as insulation. On the second floor, the sleeping quarters and the baths are located so that the maximum amount of insulation between the various rooms is secured. The recreation and child's playroom are placed in the basement, above grade, for noisy activities. Exterior views of this house are shown in Fig. 35 and Fig. 112.

Plan Types

Countless numbers of house plans have been developed as the result of arranging areas and spaces to meet most nearly the requirements of families and the limitations of cost, site, and climate. Those which are startling

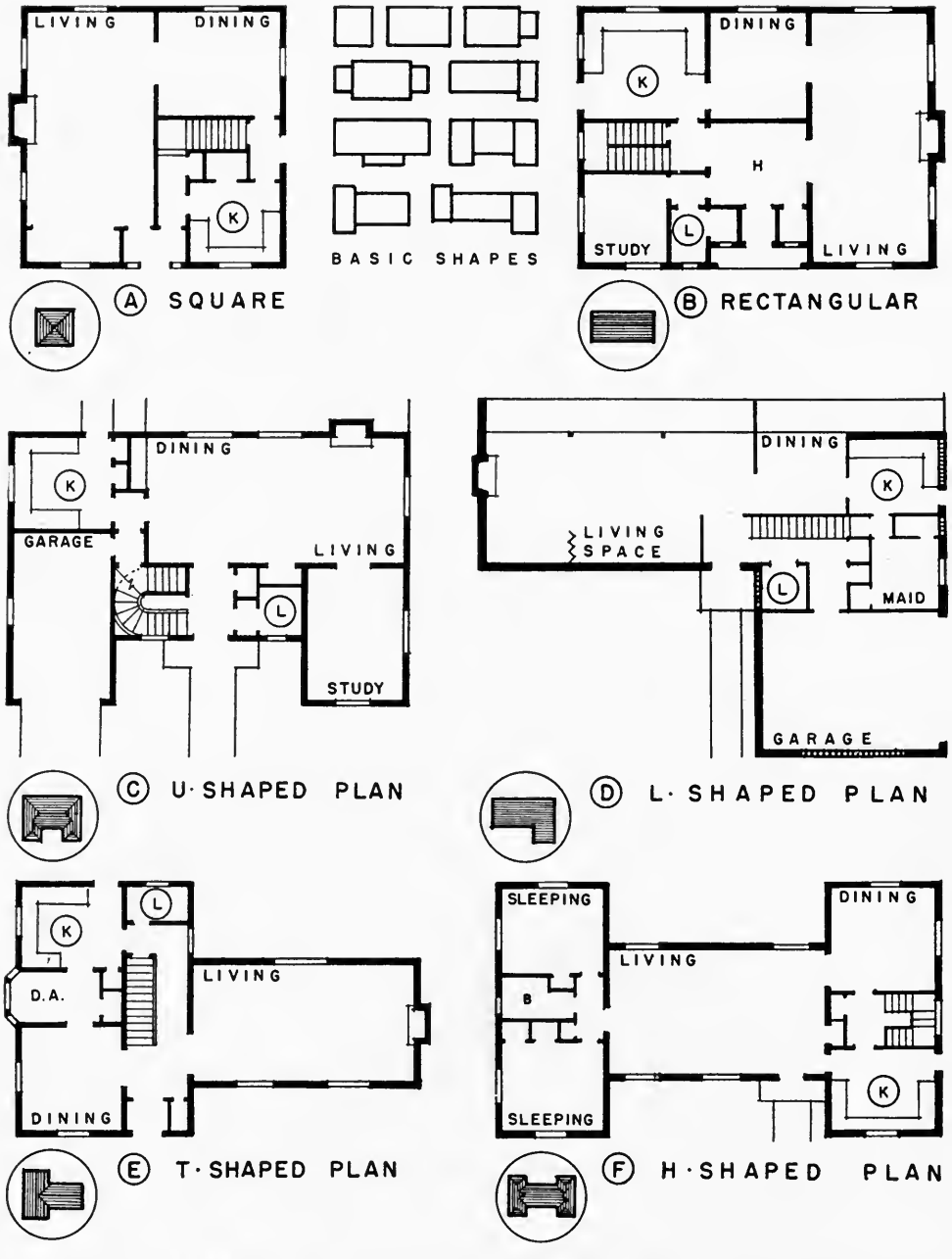


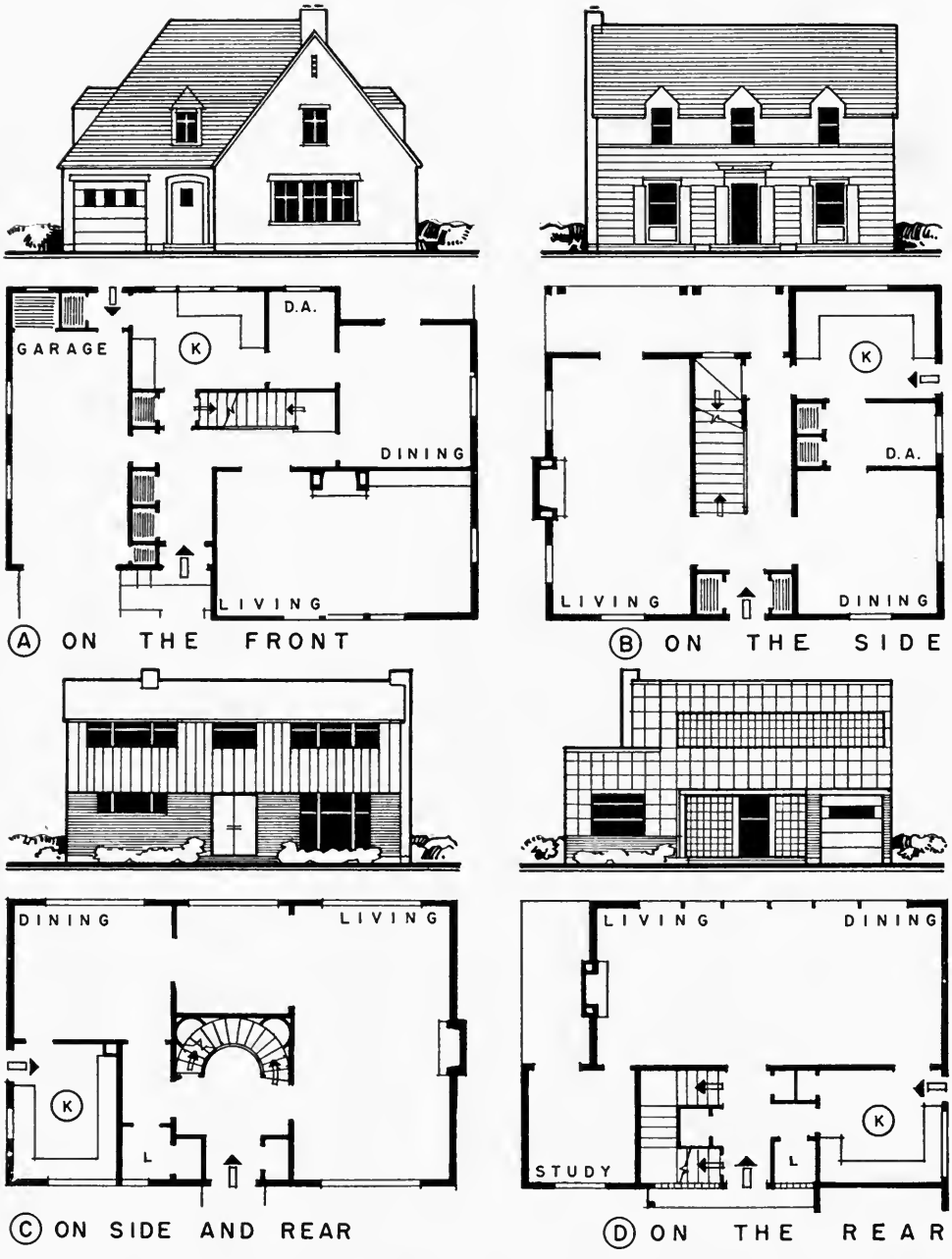
FIG. 18. In spite of many variations, house plans may be grouped according to a few basic shapes. These shapes should result from the influence of function, construction, and site.

and original in their conception today are ordinary and outmoded tomorrow. And those which are believed to be unique in their originality are often found to be stereotyped and ordinary even today. Many a designer has been disillusioned by finding his pet scheme illustrated in a magazine or already built and occupied. So many thousands of houses have been built, in this century alone, that the odds are against any of us just reaching into the architectural grab-bag and pulling out a new solution, especially if traditional thinking and forms are followed. New types of houses develop as the result of changing social and economic conditions, of advances made in the science of building, and of a different philosophy toward living in a shelter. Some day we may have houses built of synthetics and suspended in space so that they will have little resemblance to those with which we are now familiar. But until that time arrives, we may continue to classify dwellings according to present-day characteristics.

Physical Characteristics. In spite of the countless numbers, houses may be grouped under a few general headings. There may be many variations of a single scheme, but it will be found that only a few fundamental schemes exist. The following list of characteristics will assist in a classification:

1. Character of plan:
   Formal and symmetrical.
   Informal and unsymmetrical.
2. Location of major rooms:
   Living room on front, kitchen on rear.
   Living room on side, with center hall
   separating it from dining room and kitchen.
   Living room across rear, kitchen on front.
   Living and dining area in L-shape around kitchen.
   Living units in one line parallel to street.
3. Shape of plan:
   Square, rectangular, T-shape, L-shape, U-shape, H-shape, variations.
4. Number of floors:
   One, two, or three floors.
5. Size of house:
   Measured in terms of number of bedrooms, and inclusion of living units
   in addition to usual living, dining, and kitchen areas.
6. Cost of house:
   Ranging from the cheap to expensive, depending upon size, character of
   materials, and type of construction.

If house plans are examined in accordance with the foregoing classifica-



TYPICAL LOCATIONS OF LIVING ROOMS

FIG. 19. These drawings show the influence of the location of the living room on the shape and character of the plan. Orientation and site should help determine the position of this important unit of a house.

tion, it will be found that a few general groups will take care of most of them. For instance, a house may be symmetrical in shape, may have a center hall with the living room on one side and the dining room and kitchen on the other, may be rectangular in its volume, two stories high with three bedrooms on the second floor, and may be inexpensive in its use of materials. Thousands of plans may answer this general description, varying only slightly in the matter of size and proportions of rooms and the choice and use of materials.

The character and shape of various types of plans are illustrated on page 132. Here are shown those typical plan arrangements which are balanced and symmetrical in their general outlines and those which are unsymmetrical and informal. The square, rectangular, H- and U-shaped plans qualify as symmetrical, while the T- and L-shapes and miscellaneous variations are unsymmetrical. The drawings on page 134 show plans which have developed from the placing of the major units in various positions in the plan layout. In one, the living room is on the front of the house; in another it is one one side adjacent to a center hall; in another the living-dining area forms an L; and in another the living room is at the rear. These plans on pages 132 and 134 show some of the basic layouts characteristic of one- and two-story houses and suggest fundamental arrangements which may serve as ideas for further study and development. The activities of occupants should, in the final analysis, be the controlling influence in house design, but there must be an architectural beginning. These plans and others illustrated elsewhere in the book may serve as source material and as a guide to planning.

Chapter 17

THE RURAL HOME

While farm houses must provide the same basic elements of shelter as urban homes, there is a considerable difference in the standards of living and the scene of the daily activities of rural and city people. This is due to

manual labor,
isolation, and
lack of mechanization,

which are typical of farm life and which affect those who live in rural communities. As contrasted to those in the cities, the rural family is a productive unit. It supplies urban populations with basic foodstuffs and raw materials, often retaining a sufficient quantity for home consumption. Most of the members of the family work at home instead of scattering to offices and factories early in the morning and reassembling in the evening for dinner. The farm house and its environs are the scene of the work and many of the recreational activities of the farmer, his wife, and his children, and as such differ from the city home.

Although the farmer may be able to produce some of his food and to work elsewhere for a cash return, his total yearly income falls within the bracket of the lower third of the city population; and this does not provide a sum adequate for the purchase of the essential conveniences and comforts. Living conditions in many of our rural districts are parallel to those of city slums. The farmer may have more light and air but he is more likely to be without electricity and running water. According to numerous surveys, it has been found that in many rural districts only a small percentage of the homes are provided with electric current either from a home plant or a power line. However, the picture with reference to electric current is changing rapidly owing to the development and extension of electrical service during the past few years. It has been found that over 25 per cent of farm families in the entire country are now provided with commercially

manufactured current. This does not include those who may have home plants. The presence or absence of electricity determines the type of lighting, refrigeration, and labor-saving devices which the rural family has at its command.

The situation with reference to the water supply and sewage disposal is as serious as with reference to electric current. Conditions vary in different parts of the country, but the number of farm houses having running water and bathtubs and toilets is very small. The majority of farm wives must carry water by hand, and outside toilets far outnumber inside ones. It is for conditions like these—conditions caused chiefly by economic limitations —that the designer of farm houses must plan. Glib discussions of mechanized kitchens, tile bathrooms, and formal living rooms may find very little sympathetic reception in rural communities, unless these features are possible of attainment.

But even when kerosene lamps and hand pumps are abolished by the advent of electric lights and running water, the setting for farm living will still be different from that for city existence. This is because of the activities of rural families which call for work and recreational areas somewhat dissimilar to those of urban groups. Science may bring labor-saving devices to the farm and may improve standards of living, but farm houses will continue to be unlike those in metropolitan communities.

In spite of the difference between farm and city life and the homes which result, the principles of planning previously discussed apply to the design of rural homes. The house should be placed to take advantage of prevailing breezes, existing trees, and interesting views. It should be efficiently arranged according to slightly different activities and standards but with the same reference to circulation, flexibility, and zoning. Its exterior treatment needs the same application of creative principles, in order to insure a pleasing appearance, as does the city home. And it must be remembered that the difference between urban and rural dwellings is gradually disappearing, and that a similarity is growing more pronounced, especially in the more populous areas. This is largely due to efforts of organized agencies directed toward the education of rural people in better ways of living and to the increased mechanization of the farm. Each year sees more conveniences of the city brought to the farm and the development of a more efficient and comfortable "shelter for living."

Location of the House

In many ways the placing of the farm house is comparatively simple and presents fewer problems than those associated with the urban home. The

city dweller buys a fifty-foot lot with all its physical limitations of size and shape while the farmer has many acres at his disposal as a building site. The rural home owner may choose any one of several locations each with its own peculiar characteristics. The style, size, and arrangement of his house are not determined to any great extent by the peculiarities of the land.

Irrespective of its setting, the farm site should embody the following features:

1. The house should usually be reasonably close to the road.
2. The house should be near the barns and work buildings.
3. The farm group should be planned as a unit, both as to function and appearance.
4. Prevailing breezes should bring cooling comfort to work areas but not odors from the barnyard.
5. There should be good surface drainage.
6. There should be a lawn area around the house.
7. From the kitchen and other work areas in the house there should be a pleasant view of woods or garden and also a view of the barns.

Because of isolation of the rural home in comparison with the city house, the average farm family is often more interested in passing vehicles than the city family. For this reason the house should be placed close enough to the road for the members of the family to feel that they are a part of the local traffic which flows past the front door. It is true that many farm houses are set in the middle of the fields, away from the road, and may be reached only by a private lane, but this is often an undesirable situation. This location eliminates desirable contacts with friends who are on their way to town or to community functions and with the rural mail carrier and the driver of the school bus on their daily rounds.

The driveway from the road into the property should pass close to the side entrance of the house and should also be near the kitchen. This is the gateway to the farm home, and it is along this drive that practically all the traffic passes. Family and visitors alike, passenger cars and trucks, pedestrians and horsemen come to the side or rear entrance, for here are to be found the farm wife, children, and men workers. The front entrance is more a concession to tradition, and is used chiefly by city folk who stop to buy eggs and who wonder whether anyone is at home when no one answers their knock.

The farm group should be placed on a slight slope so that there will be good surface drainage. This is important because of the great amount of outdoor work and traffic in the vicinity of the house and barnyard. Paving is usually impractical and undesirable, and artificial drainage has

its limitations; therefore, a natural ground condition should be selected which will minimize muddy and wet work areas around the house and barns. It is also desirable to locate the house so that it will be protected from winter winds by a hill, woods, or other natural barrier which will serve as a wind-break. The summer breezes should help in cooling the kitchen, and the house should be designed and orientated with this in mind. However, care should be taken to insure that barnyard odors are not carried toward the house. If the prevailing winds are from the south or southwest, the barns should be located to the east or north of the house.

The work of the farm wife will be more interesting if the kitchen faces toward some pleasant near or distant view. Her own flower garden, rolling hills, or colorful woodlands will be more stimulating in an aesthetic sense than a muddy and littered barnyard. On the other hand, some part of the work areas in the house should command a view of the barns and the approach to the house, since the farm wife is usually in charge of the business of farming when her husband is in the fields or away from home. Such a visual control over these outside work areas will make for more efficient and convenient supervision.

The farm house would also be placed so that it is conveniently close to the barns and outbuildings. Of course the disposition and character of the different units depend upon the purpose of the farm. The requirements for grain, dairy, cattle, or poultry farms are somewhat dissimilar. Each calls for its own definite scheme for the layout so that the house, barns, chicken houses, and storage sheds will function as a unified group. Climate should play a part in determining the location of the various buildings. A mild, dry climate will permit a more open and less compact arrangement than will a cold, wet climate. Some buildings, such as those devoted to poultry and milk, which need frequent supervision from the house, should be near the kitchen entrance; others, which are related to the fields, may be located farther away.

Each farm house should have a satisfactory natural setting of trees and lawn. There is no reason why grass and flowers should not be as desirable and possible as for a city home. If an area around the house is protected from livestock and poultry, it is not too difficult to develop a good lawn bordered by shrubs and flower gardens. These will add to the appearance of the house and to the enjoyment of the occupants and of those who pass by. Pride in ownership is reflected in the exterior as well as in the interior. If the farm family is interested in an efficient, comfortable house and will plan for these qualities, the external setting will soon reflect this interest. Pleasant surroundings will pay dividends in the form of adequate

places for children to play and as a setting for family life and social intercourse.

The Plan of the Rural House

The floor plan of the rural home will be presented in a slightly different manner from that of the city dwelling. However, it would be possible to discuss it in connection with the various individual rooms of the house, as in Part Four, because kitchens, dining rooms, living areas, bedrooms, and baths have the same basic requirements no matter where they are found. Therefore, the reader should refer to these chapters for detailed instructions about the design of specific rooms, modifying the requirements in accordance with the following suggestions.

The Basement. This is often an important part of the farm house. Here will be found the central heating plant, if there is one, and storage space for vegetables, produce, and canned goods. Very often a work space, with bench, for minor repairs during inclement weather is located here, together with a washroom and a place to change work clothes. This washroom is a very essential unit and may well be placed in the basement if there is an outside entrance and also a stairway to the kitchen or dining room. This location is desirable if the plan does not permit the inclusion of this room on the first floor, adjacent to the dining facilities. It is needless to say that the basement should be constructed so that it is dry and well lighted.

On the first floor will be found the major work and living areas of the farm house, although their sizes and arrangements are likely to differ from those of city dwellings. The general requirements of the plan will become evident as we discuss the desirable characteristics of the various rooms.

The Entrance. In general, a side entrance adjacent to the main driveway is desirable. It should be close to the kitchen, washroom, closet for the storage of wraps, and to the main stairway. This and the kitchen door are the chief entrances to the house—the front entrance being used by more formal visitors.

The Kitchen. This room is the primary work area and the heart of the farm house. Here can be felt the pulse of rural life. Briefly, it may be described as follows:

1. In general, it should be larger than the kitchen of the urban home. It is used many hours a day instead of a few, and the activities are more varied.
2. It should have the same sequence of work and storage centers as described

on page 173 but should be less compactly arranged and provided with more counter or table space and more cupboards.

3. It should have an auxiliary dining area on the side next to the regular dining room with ample space for the entire family.
4. There should be more storage areas and they should be more diversified in character than in the urban home.
5. It should be possible for those coming in from the barnyard to go from the rear entrance to the rest of the house without passing through the work area of the kitchen.
6. More space should be given to the kitchen range, which is often coal- or wood-fired. Provision should also be made for a day's supply of fuel.
7. A cool closet with outside ventilation for the storage of food requiring a temperature lower than the normal temperature of the kitchen is often desirable.

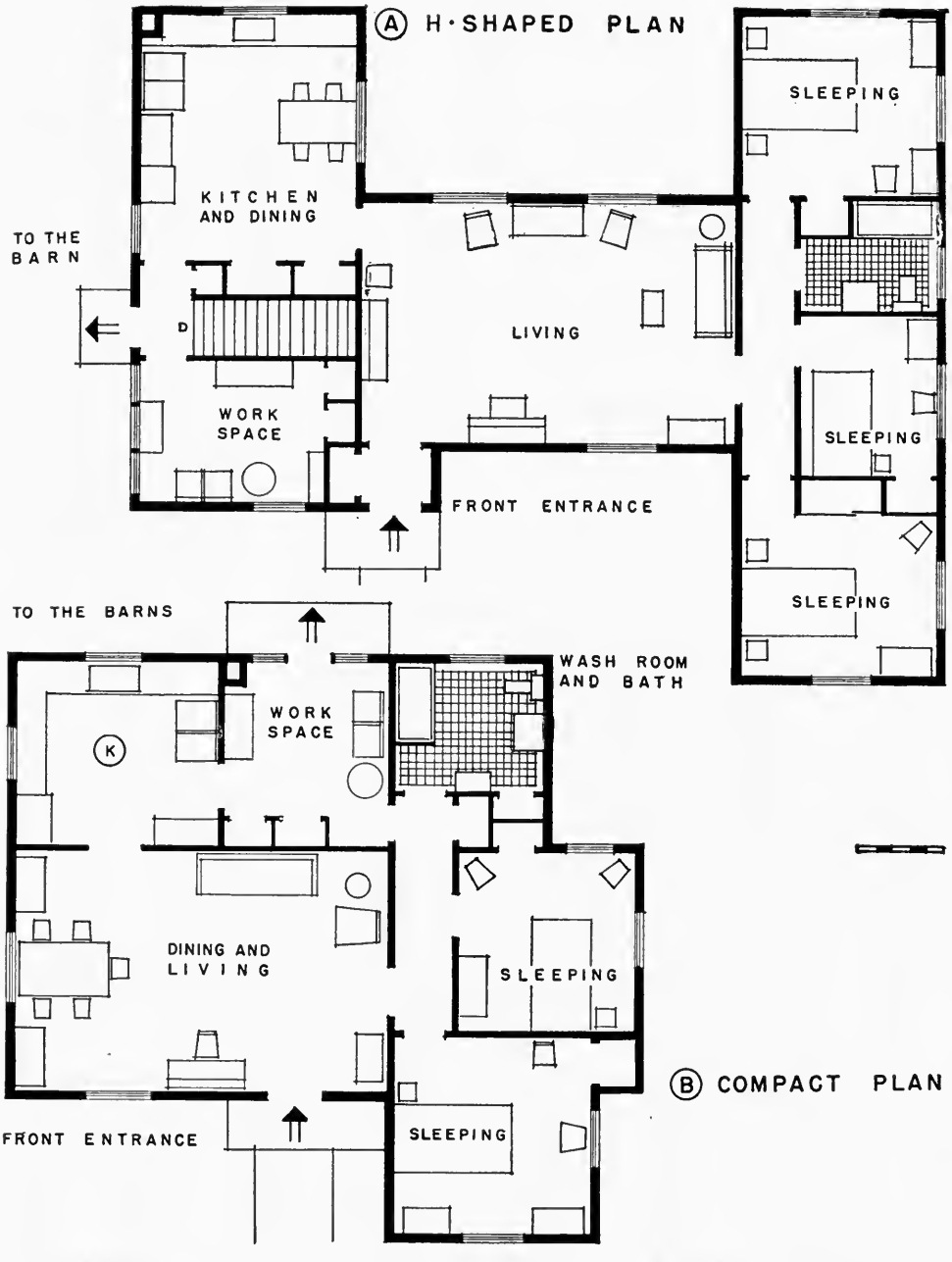
Work Space. An indispensable feature of a rural home is a workroom or porch, or both, adjacent to the kitchen.

1. It may contain the laundry tubs and washing machine. Its proximity to the kitchen will permit laundering and ironing simultaneously with kitchen work.
2. It provides space for canning, handling eggs and milk, dressing poultry, and repairing harness. It should contain storage closets.
3. If no separate washroom is provided, it may be used by farm workers as a place to prepare for the noon and evening meals.
4. This room may be equipped with an additional range and sink for canning, boiling clothes, rendering lard, and other activities.
5. It may serve as a dining space for hired hands during such seasonal periods of work as threshing time.

The location and general character of this secondary work space are illustrated in the plans of the farm houses on pages 142 and 144.

The Washroom. The lavatory of the city house is quite inadequate for the rural home. An ample washroom with toilet and with an outside entrance should be located at the rear of the house next to the barns. It should contain sufficient space for the changing and storage of work clothes. If possible, workers should be able to reach the dining area from it without going through the work space of the kitchen. The following facilities are necessary in the rural washroom:

1. One or two wash basins or lavatories.
2. Separate toilet.
3. Lockers, closets, or hooks for work clothing.
4. Bench or chairs.



EXAMPLES OF ONE-STORY FARM HOUSES

FIG. 20. Small and inexpensive farm houses with different relationships between the living, dining, sleeping, and work areas. The work space or porch is an important area in each plan. In *B* the bathroom serves as a washroom.

THE FARM OFFICE. Farming is a business, and provision should be made for the transaction of all matters pertaining to its operation and for the keeping of records. A small room conveniently located with reference to the rear or side entrance and to the kitchen should contain a desk, files for records, and a telephone. If a separate room is not feasible, space in the dining room or the workroom should be provided for these activities.

THE DINING SPACE. There are as many ideas about the nature of the dining room in the farm house as in the city home, but, on the whole, a large dining room is preferred. If the family is small, most of the meals may be eaten in the kitchen, and the dining room may be used chiefly for company or when there are several hired hands present, or as a sitting room. The use of the dining room depends upon the size of the family and the ages of the children. If the daughters are old enough to help with the serving, the major meals may be consumed in the dining room. If the dining room is used regularly, it often becomes the scene of the evening activities after mealtime. After supper the family may remain here for reading, studying, conversation, or listening to the radio. Often the conservation of heat makes this or the kitchen the only comfortable rooms in the house during cold weather and dictates its use as an all-purpose area. There should be ample closet storage for books, games, and the accessories associated with sewing, if the dining room is to be used as a place for sewing and mending. More desirable, however, is a small separate room for sewing, as shown in Fig. 62*B*, because the farm wife makes a larger percentage of the family's clothes than does her city sister.

THE LIVING ROOM. The importance and size of the living room will depend upon the needs and interests of the rural family. Too often it resembles the parlor of the nineteenth century, with many of the recreational and social activities being carried on in the dining room or kitchen. However, all the major rooms on the first floor may serve as living units and in this way provide space for the noisy and quiet activities. The young people may entertain their friends in the living room while the older folk read in the dining room, thus avoiding a conflict of family interests. The living room should naturally be planned as efficiently and carefully as one in a city home, providing the floor areas and wall spaces necessary for the various major and minor groups of furniture (see Chapter 18).

THE BEDROOMS. One of the chief sources of annoyance in rural homes is the lack of proper sleeping rooms. Because of the large families, the low incomes, and the inadequacy of the houses, all so often typical of many farm groups, privacy in sleeping quarters has never been stressed as much

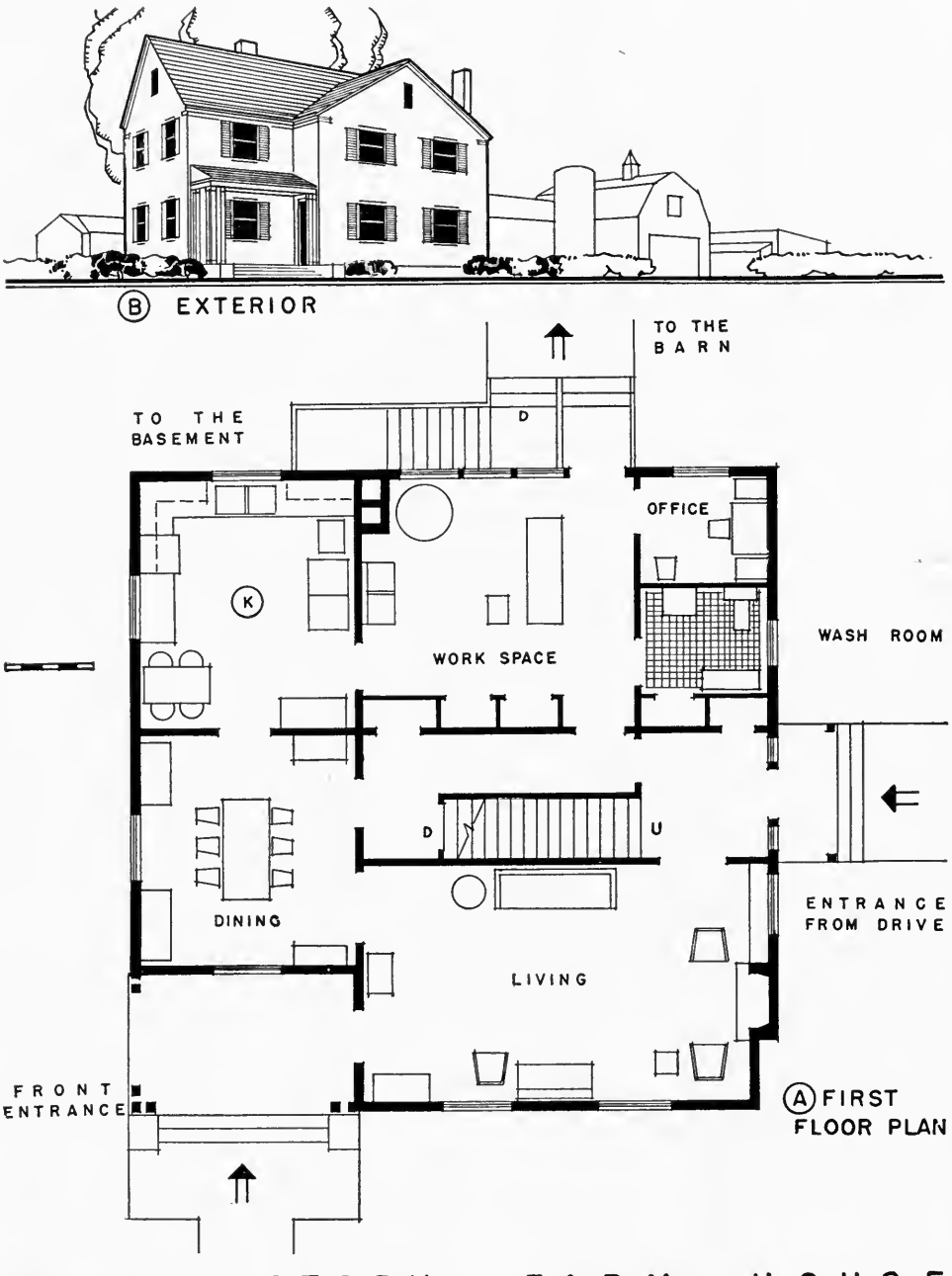


FIG. 21. A modern farm house which contains many of the desirable features necessary to a successful solution—large kitchen, work space, wash room, office, and side entrance.

as in city communities. Sleep, after a hard day's work at manual labor, is welcome and sound but it has never been a ritual. Bedrooms have often been unheated in the winter and hot in the summer—places to be avoided except for the actual physical process of sleep. It is no wonder that rural bedrooms have been rather casual affairs.

This should be corrected in planning for the modern farm house. The same careful thought should be given to their size, proportions, location, and capacity for furniture as that spent upon planning city bedrooms. Separate rooms for most members of the family are desirable, together with adequate storage closets. If the rooms themselves cannot be heated properly, perhaps the bathroom will provide a place for comfortable dressing. Whether there is a bathroom or not, it is often desirable to provide a small heated dressing room near the bedrooms. This will be found to be a convenience rather than a luxury.

On pages 142 and 144 there are plans for several farm houses ranging in size from the small, one-floor type to the larger, two-story structure. In these examples will be found most of the desirable features previously mentioned, although it should be remembered that the inclusion of one necessary room often eliminates the other. If little attention were paid to size, cost, or plan arrangement, any house could contain every conceivable room; but, when the customary limitations are imposed, certain sacrifices and compromises must be made. This applies generally to all architecture and specifically to all houses. The farm house is no exception.

STUDY EXERCISES

1. Select three prospective home owners of different personalities and collect illustrations of houses to express their personalities.
2. Select five divergent occupations and list the rooms and type of houses needed by the families represented.
3. Make a list of the rooms and type of house needed by:
   a. Family of two, both employed at clerical work.
   b. Family of four, with two preschool children, income $2,400.
   c. Family of five, three children near high-school age, income $3,600.
   d. Family of six, four children ages 3 to 12, income, $1,800.
   e. Rural family of five, three children of school age, and one hired man.
4. List the changes in activities and interests of a specific family, as indicated on page 54.
5. Make a planning guide for a specific family based on the guide shown on page 55.
6. Select five houses from magazines and estimate their costs by both the cubic-foot and square-foot methods.
7. Make an analysis of the incomes of the families listed in study exercise 3 above

in accordance with the methods described on pages 67 and 72. What price houses can they afford, and what should their monthly payments be?

8. Collect plans and illustrations of minimum, inexpensive, medium-priced, and expensive houses based upon the incomes of your own particular social group.

9. Collect plans and exteriors of outmoded houses and make sketches and suggestions showing how these houses may be modernized with the minimum amount of changes and expense.

10. Analyze several rented houses or apartments from the standpoint of convenient plan arrangement and pleasing interiors.

11. Collect illustrations of low-cost and low-rent housing projects and classify them according to type.

12. Is the immediate neighborhood in which you are living appreciating in value and appearance or is it depreciating? State reasons for your belief.

13. Choose a definite rural setting and list the desirable and undesirable features with reference to its use as a home site.

14. Analyze the transportation, shopping, and recreation facilities of your community with reference to proximity, adequacy, and modernity.

15. Collect pictures of poorly planned and well-planned neighborhoods.

16. Select a definite neighborhood and make a study of the people with reference to their nationalities, occupations, financial status, standards of living, and educational attainments. Make a chart of this factual material and evaluate the neighborhood as a desirable location for your home.

17. Select five definite sites of varying characteristics with reference to size, shape, contours, and orientation. Make sketch plans of the sites and show possible locations of the houses. List the influences upon the placing and the types of houses.

18. Plan a house for the family in study exercise 5 in accordance with the method described on page 117.

19. Make a sketch plan of this house, trace the paths of circulation, and analyze it for flexibility and zoning.

20. Collect examples of formal and informal plans, varying in size, shape, and location of the major rooms. Classify and analyze them for desirable and undesirable qualities, and for circulation, flexibility, and zoning.

21. Analyze the housing needs of a specific rural family, as suggested on page 55.

22. Select a definite site in the country and locate the house and barns with proper regard for use, drainage, orientation, breezes, and roadway.

23. Make sketch plans of a one-story rural house for a family of four, showing the location of the major rooms.

24. Make sketch plans of a two-story rural house for a family of seven.

PART FOUR

THE DESIGN OF PLAN UNITS

Chapter 18

AREAS RELATED TO RECREATION

We may now assume that a general plan has been developed in accordance with the influence of site, cost, and the requirements of the occupants and that we are ready to proceed to the design of the individual rooms. Our study will be more detailed and specific, because we are going from the general to the particular. After the positions of the various rooms are decided upon, it is then necessary to plan each room carefully, keeping in mind the same factors of function circulation, flexibility, and zoning which served as guides during the early stages. However, we must now think in terms of inches instead of feet. We must plan accurately and precisely, working with sizes of rooms, locations of doors and windows, areas of wall spaces, directions of door swings, placing of lighting outlets and switches and heating accessories, and the grouping of furniture. Successful planning depends upon the coordination of all these items with the activities which the various rooms are to house.

We shall begin with the recreational area because it is probably the most important and fundamental room in the house. It is usually the largest unit in the plan and the one which is often instrumental in determining the shape and character of the plan (see pages 132 and 134).

Later we may, for the sake of conforming to common practice, call this general recreational area the "living room," but it is desirable to think of this space and the activities usually carried on in it in a much more fundamental manner. The term "recreation" can be made to cover those interests and needs of people when they are relaxed, resting, or playing—in short, when they are not working, sleeping, or eating. Recreation is "the act of giving fresh life—it is the act of reanimating, relieving, cheering, diverting, amusing." This definition certainly covers the many things for which people use their living rooms, as well as other associated areas. So we shall use the word in an all-inclusive way rather than limit it to the popular association with games, sports, and dancing.

Types of Recreation

Recreation has become, in recent years, an important spiritual necessity. The desire for mental and physical relaxation has been with us always, but relaxation was once for young people and for them only grudgingly. Adults had to work long hours in homes, factories, fields, stores, or offices, and children had to lend a hand with the chores after school or during the summer. If youngsters found time to steal away to swim, play ball, or read *Swiss Family Robinson*, this waste of time was sometimes condoned with the excuse that they were young only once. Recreation for older folk was looked upon as frivolous. A little quiet conversation, reading of the weekly papers, some church music around the organ for the rural people, or an occasional evening at the theater with a Gilbert and Sullivan opera for the city dwellers were typical of our grandparents' recreational activities.

All this has changed with the industrial expansion and the coming of improvements in the processes of manufacturing and the conduct of business and farming. It is no longer necessary to work such long hours, and something must be done with our leisure time. Civilized man, for the first time in centuries, can be primitive. Without apologizing, he may relax and play, giving expression to his natural inclinations. He and his children have more leisure time to spend at home, and his wife finds herself less tied to housekeeping duties. The home must be planned as a background for the activities growing out of this increased leisure.

Provisions must be made for the various forms of recreation, which may be classified as follows:

- Adult Recreation
  - quiet
    - conversation
    - reading
    - writing
    - music
  - active
    - entertainment
      - intimate, small
      - informal, gay
      - formal, organized
    - personal play
      - games
  - hobbies
    - collections, crafts

Child Recreation
  young
    supervised
  older
    active—games, hobbies
    quiet—reading, music.

Adult Recreation. Much of the success in house planning depends upon how well these various activities are cared for and how many are left to chance.

Living areas should be adequate in size and not too small for convenient use. The minimum house, the result of the need for economy, often becomes too compact for comfort. The necessary wholesome relationships of family life are hampered if the space for living is too cramped. Living areas should be divided and equipped in such a manner that noisy and quiet recreation may be carried on with the minimum amount of conflict. Room and furniture arrangements should provide the proper backgrounds for the type of entertainment most characteristic of the family. In the city home much of the conversation, reading, and games will take place in the living room and in a basement or first-floor recreation room, with a definite separation of work and relaxation. The man's work is usually carried on away from home, and he wishes to rest when he is at home. The city housewife takes care of her housework during regularly assigned hours, and relaxation is a definite activity.

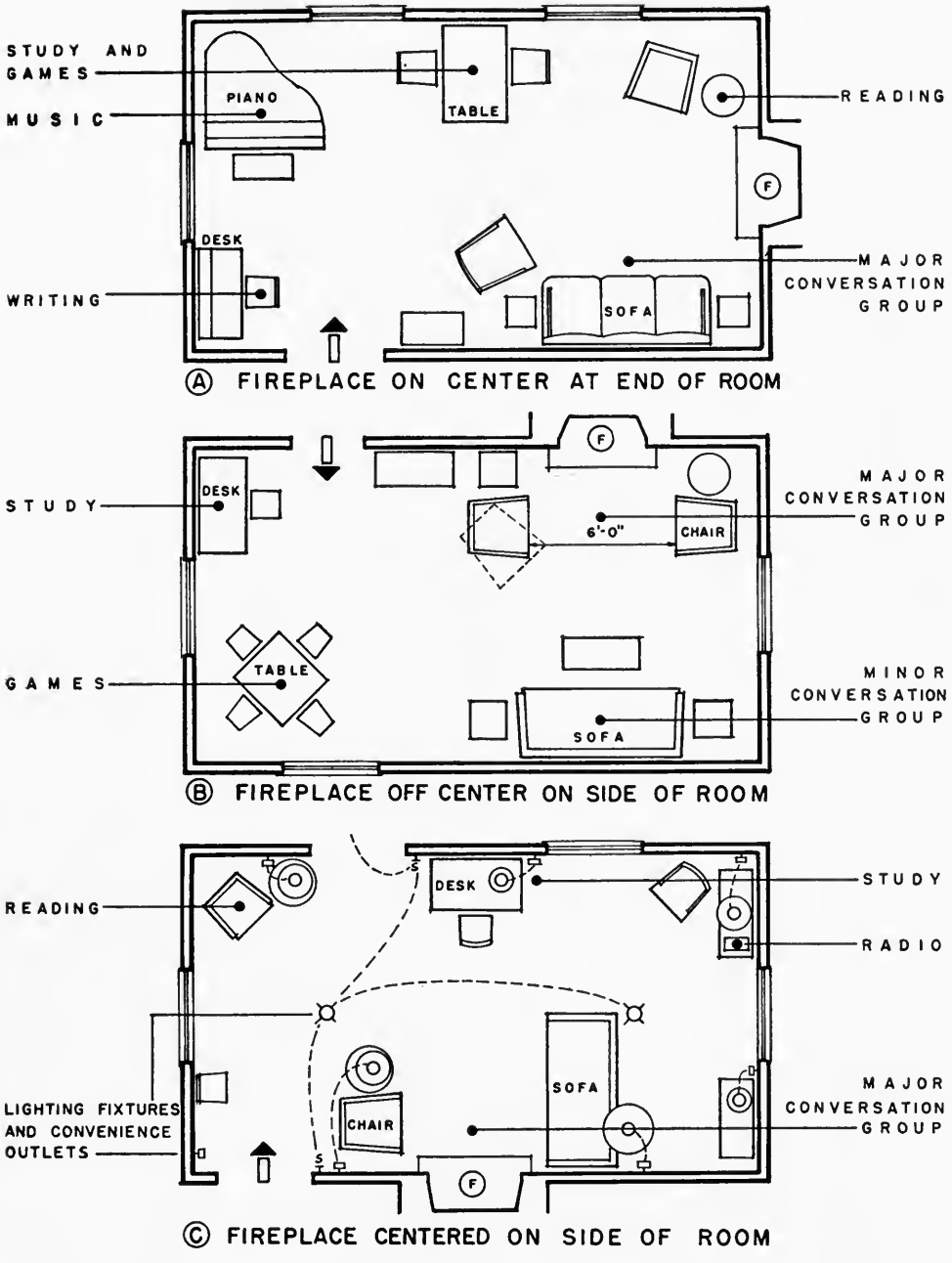
In the rural home recreation or relaxation is usually more casual and is often sandwiched in between the household tasks of the housewife or the daily chores of the husband. The scene of recreation may be the kitchen, work porch, or dining room, with the living room more likely reserved for company. Entertaining in the country is usually of the informal type—neighbors dropping in for a few minutes in the evening or relatives for a Sunday dinner, for which a large dining room and front porches are put to use. Recreation does not have to be so definitely planned for in the rural home, but provision should be made for the father to read the papers, for mother to listen to the radio, and for the children to indulge in hobbies. In recent years the various national and local clubs for young people and adults have become a conspicuous feature of rural life. Some of these club activities take place outside the home, but the farm house is often the scene of the meetings of women's groups—a factor to be kept in mind when planning the rural home. In both city and rural homes, thought should be given to a place for the adolescent daughter to have a "date," without being forced to resort to a parked car by the side of the road. Courtship

does not thrive under parental eyes, but it is an uneconomical use of space to give a large living room over to one young couple. It might be better to furnish the dining room in such a way that it becomes a secondary parlor for the young couple, leaving the living room for the other members of the family.

However, there is more to family life than social intercourse. Individuals do not always want to be together. The social needs of mankind are concerned with the securing of privacy as well as the development of a moral code and the establishment of a position in the community. (See page 5.) Privacy is a fundamental need. It may be of several degrees—partial or complete. An individual may wish to be away from others and entirely alone, or he may want to be away from strangers and with his family. The house should foster the enjoyment of intimacy. (See page 25.) Dwellings are built to secure physical shelter and to provide for spiritual seclusion. Normal human relations depend to a considerable degree upon a successful house plan.

Child Play is a fundamental activity. It stimulates imagination and develops the ability to do things well by the process of repetition. Facilities for play are often neglected in house design. Too much is left to chance, with the result that constant annoyances arise out of the lack of adequate provision for this necessity. When children are young, their play activities must be supervised, or they must at least be watched. Since so much of the time of many mothers is spent in the kitchen, it is desirable to plan a corner of this work space as a play area, as shown in Fig. 38*F*. This may be done without sacrificing the efficiency of the kitchen, because the various work centers may remain in a compact arrangement with only the addition of this feature. Or if the kitchen window overlooks a small play yard which is safely screened and protected by a fence or hedge, the mother can keep an eye on small children while at work, as shown on page 126. If the dining room opens directly into the kitchen, it may be furnished in such a way that it becomes a play area without creating too much havoc with its functional setting for the activity of eating.

As children grow older there is less need for supervised play but more need for space for their other activities. Children have active and quiet interests the same as adults and they feel frustrated if denied definite places for the carrying on of their desired activities. They need some privacy, and a place for their possessions which to them are just as important as those of adults. Normal children want to keep pets; but where can they keep them in the average city home? Healthy children engage in active play; but where can this be done without conflict of interests? On rainy days



TYPICAL LIVING ROOM ARRANGEMENTS

FIG. 22. These plans show how furniture groupings may be adapted to various types of recreational activities with the fireplace as the center of interest.

children play either over the entire house or in the living room, dining room, bedroom, attic, basement, or in the kitchen—in other words, in no definitely assigned place. This usually means a disarranged house with daily disagreements and does not indicate satisfactory planning for basic interests. Well-designed homes should provide for child play.

The Living Area

While the living area is not so standardized as the kitchen, still it may be studied as carefully and with the same assurance that satisfactory arrangements will result. The various activities which grow out of the need for recreation may be taken care of in a single orthodox living room, in an "open" plan, or in a number of separate smaller areas, depending upon the size of the house and the inclinations of the family. As we have already indicated on page 151, it is desirable to plan the living room proper for the quieter forms of activity, such as light reading, conversation, quiet games, and low music. The noisier and more active forms of play should be confined to a game room, while study and serious reading should be done in some kind of quiet room—either a library, a bedroom, or even a dining area if it is isolated from the noisy centers. We are thus separating the active from the quiet types of recreation.

Activities. The area for general recreation, or the space for living, should have centers for various activities just as the kitchen has its work centers, and they should be planned just as scientifically. While the sizes and kinds of furniture will vary more than does the equipment in a kitchen, still there is enough standardization for typical groups to be developed from the pieces of furniture listed below.

Sizes of Living-Room Furniture

Sofas	2 ft. 6 in. to 3 ft. 6 in. deep × 6 ft. to 7 ft. long
Love seats	2 ft. 6 in. to 3 ft. deep × 3 ft. 6 in. to 4 ft. 6 in. long
Chairs	
Club	2 ft. 9 in. × 3 ft. 6 in.
Wing	2 ft. 6 in. × 2 ft. 9 in.
Bridge	1 ft. 6 in. × 1 ft. 6 in.
Desks	
Flat-top	2 ft. to 2 ft. 6 in. deep × 4 ft. to 5 ft. long
Governor Winthrop	2 ft. × 3 ft. to 3 ft. 8 in.
Secretary	1 ft. 6 in. to 2 ft. deep × 3 ft. to 4 ft. long
Highboy, lowboy	1 ft. 6 in. to 2 ft. deep × 2 ft. 6 in. to 3 ft. 6 in. long
Tables, rectangular	
End	1 ft. 3 in. × 1 ft. or 1 ft. 8 in. × 1 ft. 8 in.
Coffee	2 ft. × 3 ft.
Bridge	2 ft. 6 in. × 2 ft. 6 in.
Console	1 ft. 6 in. × 3 ft.

Tables, circular	
Lamp	2 ft. dia.
Coffee	3 ft. dia.
Drum	3 ft. dia.
Pie-crust	3 ft. dia.
Pianos	
Grand	4 ft. 10 in. to 5 ft. wide × 5 ft. to 9 ft. long
Upright	2 ft. × 5 ft.

These dimensions, representing the average sizes of the most common examples of living-room furniture, may be used as a guide to planning. The various recreational activities call for the following:

For conversation:
chairs, sofas, love seats, small tables for smoking supplies.
For reading:
same as for conversation, with an additional table for books and magazines, and reading lamp.
For study:
desk, chair, bookcases, secretary, lamp.
For music:
piano and bench, radio, phonograph, easy chairs, storage for records and sheet music.
For games:
tables and straight chairs.
For entertaining:
combinations of many of the foregoing, with the addition of such miscellaneous items as coffee tables, smoking stands, and occasional tables.

The list above makes no effort to designate the specific chairs and tables suitable to each activity. These different pieces of furniture may lend themselves to several uses and may be selected with that thought in mind. However, furniture should be chosen with an eye to certain physical aspects of its function. There are different types of equipment which are best suited to the various mental and physical activities related to recreation. Lounging and reading require low, soft chairs to encourage restful and complete relaxation, while the alert mental processes needed in bridge, writing, or studying are stimulated by harder, upright chairs. Tables should be adjusted in height, width, and type to the chairs with which they will be used and to the kind of activity with which they are associated.

Fundamental Arrangements. The designing of a living room offers another opportunity for the use of small pieces of cardboard to represent the various items of furniture which are to be used in the room. This method of study was described on page 117. These pieces may be cut

out at the scale of one-quarter inch equal to one foot and marked with different colors so that the designer can distinguish between chairs, couches, and tables. If an area is drawn on a piece of paper to represent the living-room space, then these pieces of furniture may be pushed around in an effort to find satisfactory locations and combinations, as shown on page 157. Desirable dimensions are listed below:

DIMENSIONS FOR LIVING-ROOM ACTIVITIES

Clearances

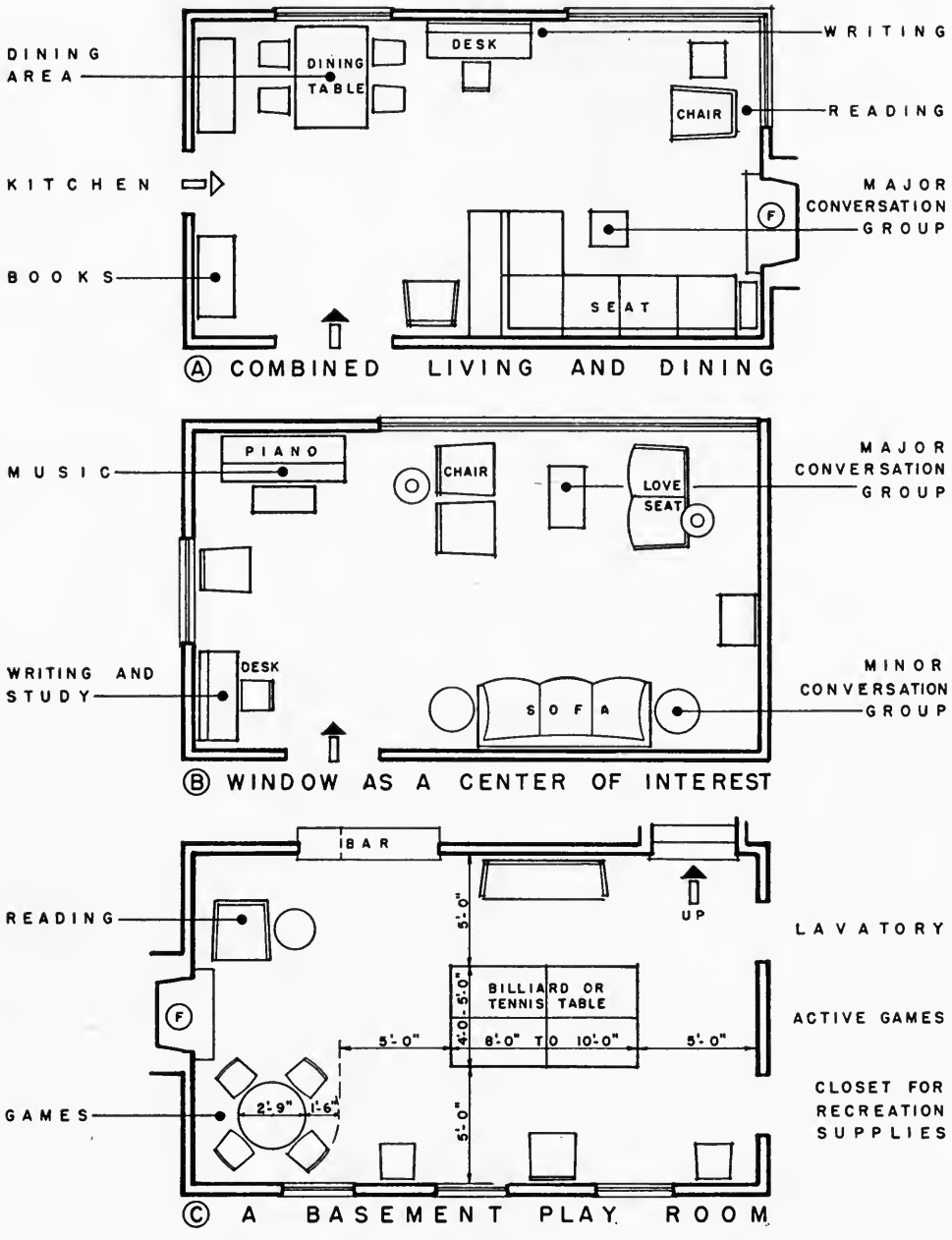
For passage	
Major traffic lane	6 ft. wide
Minor traffic lane	4 ft. wide
Between table, piano, or desk and wall—including chair	3 ft.
Between two low pieces of furniture	1 ft. 6 in.
Between high furniture and wall	2 ft.
For quiet activity	
Space needed beyond front edge of straight chair for occupant's feet	1 ft. 9 in.
Space needed beyond front edge of lounge chair for occupant's feet extended	2 ft. to 2 ft. 6 in.
Space between pieces of furniture in fireplace group facing each other	5 ft. to 6 ft.

Before the designer has gone very far, he will discover that much of the success of a plan depends upon the location of the doors and windows. There are three methods of considering these items and of arriving at a satisfactory arrangement for any of the major rooms of a house, as follows:

1. If the openings are fixed, the furniture must be selected and arranged in accordance with the resulting walls.
2. If the furniture is a fixed and deciding factor, then the opening and walls must be placed to conform.
3. If the furniture and the walls and openings can be considered together and the entire composition kept flexible until it "jells," the results are likely to be the most satisfactory.

This last procedure means that all the factors affecting the success of a living room should be studied as a unit, just as a woman selects a spring or fall ensemble with an eye to line, material, and color in the hat, suit, dress, gloves, and shoes. A beautiful and comfortable living room is not an accident; it is the result of skillful planning.

The Fireplace. In all forms of creative art—and the designing of a house is an art as well as a science—there must be a central theme about which the design is developed. In a living room, there should be the same center of interest with other minor centers building up to and emphasizing the



TYPICAL RECREATION AREAS

FIG. 23. The position and proportions of walls and openings may determine the arrangement of groups of furniture in the general living area, as suggested in these plans.

Western Pine Assoc.

FIG. 24. The fireplace as a center of interest. Traditional Colonial treatment.

more important attraction. Most frequently the fireplace is selected as the dominant note in the room, and some of the most important pieces of furniture are grouped around this feature to form a major conversational group. At this point we might ask about the advisability of including a fireplace in the plan of the proposed house. With our modern heating plants, it certainly is not needed to furnish heat, so it cannot be excused on that account. There are several months of the year when it cannot be used at all and when the furniture around it may have to be rearranged to point to some other more seasonable center of interest. But, in spite of this, fireplaces continue in popularity, chiefly because reason or logic has not entirely replaced sentiment. Some urge, holding over from the days when our forefathers gathered around the warmth of a campfire or the cheerful hearth of a Colonial kitchen, still draws modern man to the fireplace. Fire is symbolic of comfort and the unity of family life. For centuries groups have gathered before its flickering flames in silent meditation or boisterous talk, according to their particular moods. It would be unfortunate for social intercourse if wood-burning fireplaces were replaced by gas logs or were even omitted entirely from the American homes which can

Owens-Illinois Glass Co.

FIG. 25. Reading and conversation group in front of fireplace. Non-traditional interior.

afford them. However, a fireplace is a luxury in a small and inexpensive house. It is better to omit the fireplace entirely than to crowd in a small and inefficient one which is nothing but a source of annoyance.

Another reason for the retention of the fireplace is the fact that its architectural treatment makes a permanent and usually beautiful feature which sets the style for the rest of the room. It establishes a focal point of interest—a center from which to begin in planning the remainder of the room. So until the age of mechanization completely banishes romance from our lives, we shall probably continue to include fireplaces in many of our living rooms. The photographs on pages 158 and 159 and the drawings on pages 153 and 157 show the importance of this feature and some of the typical ways in which furniture may be arranged as a major center for conversation or reading.

Other Centers. If the home is too modest or if the family does not care for a fireplace, some other center of interest should be found. This usually is a large window, either a bay or picture window, with a pleasant view, as shown on pages 160 and 163, or a large wall space which may form the background for some important piece of furniture, such as a secretary, a large table, a highboy, or a davenport with a wall hanging or pictures, as in

Pittsburgh Plate Glass Co.

Owens-Illinois Glass Co.

FIG. 26 (*above*). An "open" plan with a group of furniture in front of a picture window.
FIG. 27 (*below*). An area for relaxation, conversation, and writing. Non-traditional.

Pittsburgh Plate Glass Co.

West Coast Lumbermen's Assoc.

FIG. 28 (*above*). A quiet area for studying or reading. Built-in cases. Simple furnishings.
FIG. 29 (*below*). A study or possible guestroom paneled in red cedar. Hollis Johnson, Architect.

Fig. 71. Around this selected focal point should be arranged the major group of furniture, usually one for conversation since this is the most important recreational activity. Minor groups for conversation, reading, or writing may then be composed with reference to the physical characteristics of the room. These should be placed around the perimeter of the area leaving the center free for general circulation. The plans on pages 153 and 157 show a number of typical ways in which furniture may be arranged for the various groups.

Circulation. The size of the room will naturally determine the amount and kind of furniture which should be used, but it is well to keep in mind that simplicity of arrangement and sparsity in use of furnishings is better than complexity and overcrowding. The paths of circulation through the room from one door to another or from one door to the far end of the room are usually quite obvious and well defined, as indicated on page 122. It is mandatory that the groups of furniture should not interfere with any normal traffic. Circulation paths should take one to these groups but not through them. One of the greatest faults in planning is placing the fireplace too near important openings, as in Fig. 4A. If this is done and if the necessary composition of furniture is carried out around the fireplace, the arrangement will tend to block or divert traffic, and guests will feel that they are sitting in a conspicuous place and should apologize or move. A fireplace and its accompany furniture should be out of the paths of circulation, similar to the plan shown on page 130.

Wall Spaces. The location and size of the various wall spaces are important factors in the design of any room, and this is especially true of the living area. This is the major show place of the house and one which should also function in a satisfactory manner. Here there should be evidence of serious thought and a knowledge of design and good taste. There can be no rules for the placing of windows and doors; too much depends upon the site, orientation, and functional planning. However, we can at least keep in mind that walls can and should be composed. They should be assigned definite areas and proportions, which should be interesting and pleasing and harmoniously related to each other and to other dimensions of the room. These are matters which require considerable study and experience, but some fundamental suggestions for an approach to the subject are discussed in Chapter 26. These wall areas must be considered in connection with the furniture for which they are to form a background. While the primary function of walls is to enclose space and to provide shelter, their contribution to the interior of a room is in the field of composition—the composition of two-dimensional surfaces and three-

U. S. Plywood Corp.

FIG. 30 (*above*). Living area as part of open plan. Concentration of windows. Plywood walls.
FIG. 31 (*below*). Opposite end of room illustrated in Fig. 30, with dining area shown at right.
Dubin & Dubin, Architects.

dimensional objects. Unsatisfactory arrangements will result if the shapes and types of walls and furniture do not agree. Bulky objects in small corners or against narrow spaces, a small piece of furniture against a wide wall, pieces too high for the windows under which they are placed, and groups so crowded that they project into the room at awkward angles are examples of poor relationships between wall spaces, openings, and furniture. The non-traditional plans and exteriors offer the greatest flexibility of arrangement. Windows and doors may be shifted more easily because they do not have to follow the rules of spacing dictated by stylistic treatment. Windows may be concentrated along one side of the room or in the corners, leaving more usable wall area than where they must be spaced regularly. However, if this is done, some other outside opening in the room is desirable in order to provide cross ventilation and to serve as an additional light source for the elimination of glare. The modern movement has provided the high horizontal type of window which makes for greater ease of furniture arrangement. Panels of glass blocks will admit light, retain privacy, and permit interesting groupings of furniture, as seen on page 160.

Another important but often overlooked, factor in the design of wall spaces in any room is the location of heat registers, radiators, and electric outlets. Many an architect and home owner have been embarrassed and disappointed to find that these utilities interfered with the placing of furniture. These items should be located, as a rule, near the edge of important wall areas, so that they will not come behind sofas, chests, or tables. A little study will devise locations where they will be adaptable to various furniture combinations.

Flexibility. Since flexibility is desirable in the general plan, it is logical to assume that it is also worth while in a single room. Every housewife plans a living room for two uses:

1. The normal activities of family life, and
2. the activities related to entertaining.

Some society matrons judge the size of a living room by the number of bridge tables it will accommodate. Whether the family entertains simply or elaborately, there will be times when the carefully arranged groups will lose their identity, and these occasions should be kept in mind when planning the room. It is not desirable to have too many groups of heavy furniture arranged in such a manner that moving them is a major operation which must be performed every time a few people drop in to spend the evening. If the living room is broken up into too many small inflexible groups, it is difficult to create a spirit of hospitality and unity without

the moving of too much furniture. With a little study, it will be found that the mere turning of one chair will bring two adjacent conversational groups together and make them one, as shown in Fig. 22*B*. Furniture should thus be arranged so that a feeling of intimacy may be created and so that this arrangement can be easily changed into a more spacious and all-inclusive grouping.

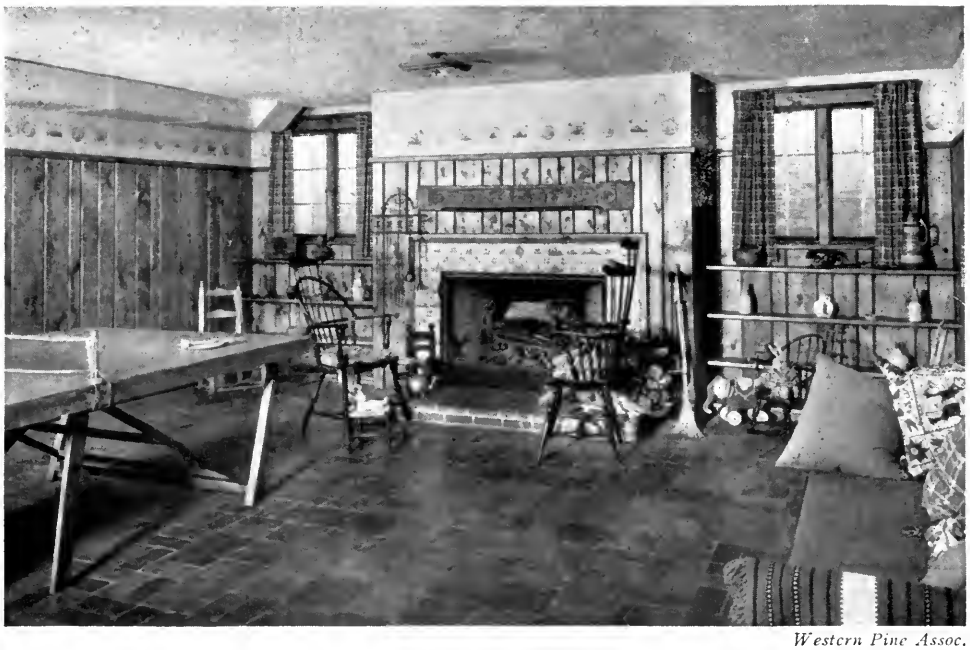
Another example of flexibility may be found in a plan where a group for conversation becomes an area for a quiet game simply by the addition of a small table, which may be kept in a near-by built-in cupboard or case. In fact, each group of furniture should be scrutinized with the hope that a multi-purpose use may be found for it. This adds to the livability of the house and often is the difference between a successful plan and one which lacks some of the desirable qualities.

Sizes. Surveys have shown that persons in the income brackets for which small and medium-sized houses are built have definite ideas about the amount of floor space which they consider necessary in a living room. This space may vary from about 12 feet by 16 feet for the small homes to about 16 feet by 26 feet for the larger houses. If an average could be found, it would be somewhere in the neighborhood of 14 feet by 22 feet. If dining is combined with living, the area of the room should be several feet greater, at a saving in total space and cost, since the dining room has been eliminated and the entire area which it might have occupied has not been added to the living room.

The desirable size of the living space is such a personal matter that even the percentages indicated in the computations on page 118 cannot apply in a fixed and arbitrary manner. The figures given there of 21 to 30 per cent of the total floor area are only for average houses and must be modified if the family's interests demand a larger area. There is a figure, however, which has been set as a minimum by housing and medical authorities, below which it is not desirable to go for health reasons. This is 50 square feet per person for any room in the house. If there are four in the family, the area of the living room should be not less than 200 square feet, or about 11 feet 6 inches by 17 feet 6 inches. If two people are to occupy one bedroom, the room should contain not less than 100 square feet, or 10 feet by 10 feet. These are absolutely minimum sizes and should be increased if financial limitations will permit.

For Active Recreation

If the necessity for economy does not reduce the house to its barest essentials, some additional provision should be made for the more bois-



Western Pine Assoc.

General Electric Co.

FIG. 32 (*above*). Recreation room for both relaxation and active games. Paneled walls.
FIG. 33 (*below*). An inexpensive basement playroom with painted concrete walls.

terous forms of play and entertainment. If father and mother wish to spend the evening reading, they do not like to be driven to their room when the young people appear for an hour of dancing or dramatics. Or it may be that the parents are not too old to enjoy a noisy evening with their own friends and may wish an area other than the living room for that occasion. The game room in the basement has thus become quite popular, especially in those houses which are built on a sloping site so that the room is above grade and is light and cheerful. However, nothing is more depressing than the average rathskeller in the less expensive houses which has been built out of what is left of the basement after the utilitarian features have been provided. It is often finished in some bizarre manner in an effort to be gay and playful, and ends by being restless and ugly. Some typical examples of satisfactory plans for playrooms are shown on pages 157 and 213. These make provision for table tennis, billiards, conversation, dancing, and light refreshments. Photographs of interiors, both inexpensive and expensive, may be seen on page 166. The inclusion of a game room is worth the added cost if there are young people in the family or if the adults like to entertain informally.

For Hobbies

One type of recreation for which we have not yet made definite provision is that connected with the various hobbies of the family. These hobbies may be so varied in character that it is difficult to plan specific areas for them, but they should at least be considered in the development of the plan. The children may have a stamp, butterfly, or arrow-head collection, mother may be fond of early American glass, and father may like to carve boats or repair old furniture. It is a dull existence if one does not have a hobby of some kind; it certainly is a perennial type of recreation. If the family hobbies are constant enough to crystallize, some hobby room may be planned, either in the basement or on the first or second floor. Instead of calling that left-over area a "sewing room," it might be labeled and equipped as a "hobby room." A basement room may be furnished with a work bench, as in Fig. 62*D*, or, if no definite space is available, some extra drawers, shelves, or a desk may be provided elsewhere in the house to hold those articles related to hobbies.

For Outdoor Living

One of the most desirable features of the modern movement in domestic architecture is its insistence upon some provision for outdoor living. By the use of large windows, an effort is made to bring the feeling of out-

California Redwood Assoc.

FIG. 34 (*above*). Ideal porch for outdoor living—covered and screened. W. W. Wurster, Architect.

FIG. 35 (*left*). Dining terrace with pergola of house shown in Fig. 112. Collaboration of architecture and nature.

doors—of nature and its beauties—into the house, but the movement does not stop there. Space need not be confined—there may be an interpenetration of space, so that one is not too conscious of being separated from the space outside the walls of the house. There is a feeling among some that we should not live a cloistered existence, surrounded by masonry walls. We should not be as conscious of architecture as we are of space and the natural things with which it is filled: air, sunshine, and the tangible things of nature. We are thus led out of doors to the enjoyment of these things, and, since this is desirable, we should provide for recreation in the open. As with indoor activities, this recreation may be either quiet or active. We may rest quietly on the porch or play a game of badminton on the lawn. With more time for leisure, facilities for outdoor living are becoming more necessary. The general plan of the house will dictate the location of the living porch or terrace, but serious thought should be given to its placing with reference to sun and wind and to its size and equipment. To permit the most complete enjoyment, it should be covered and screened and furnished with durable but comfortable furniture for genuine living out of doors. If it is not located too far from the kitchen, it may also be used for outdoor dining, an activity which Americans have borrowed enthusiastically from the Europeans. A mild climate encourages an open, rambling plan and more porches than does one which is colder. This is another reason why Maine houses should be different from California ones.

Chapter 19

AREAS RELATED TO THE PREPARATION OF FOOD

A physical necessity which is more important to life than those necessities related to clothing and shelter is food. Most food must be prepared before it is consumed and, as a result, the kitchen has undergone centuries of development. The modern kitchen has become a laboratory for the preparation of food. It is one room in the house which can be planned scientifically and in which the various activities may be charted accurately around standardized pieces of equipment.

However, the housewife must decide how scientific and machine-like she wishes her kitchen to be in appearance. There are those who prefer a compact laboratory designed only for the preparation of food, and there are others who want more room for additional activities and more opportunity to express their personalities in the choice of equipment and decorations. A gleaming white kitchen of stainless steel, enameled metal, and tile may be efficient but impersonal. A kitchen composed of other materials less machine-like in their nature and arrangement may function adequately and also lend itself more readily to the general character of the house. Kitchens may be small or large—depending upon the floor space available and the interests of the family. Some families prefer to retain a little of the old-fashioned coziness of earlier kitchens where neighborly gossip helped to relieve the tedium of daily tasks. A spacious kitchen may afford a place for casual visiting, for baby to play, for checking monthly bills or recipes, or for informal dining. This is possible with no sacrifice in efficiency if the work centers of the kitchen itself are compactly and sequentially arranged and if the spaces for other activities are outside the main work area.

Kitchens Old and New

The contemporary surgical-like kitchen is quite different from its predecessor of several generations ago. This material apparatus of a culture, the kitchen, has undergone a metamorphosis because of the gradual influence

of new modes of living. In order to understand more fully some of the problems of kitchen planning, it is desirable to look at a few of the kitchens of the past and to study the changes which have contributed to their physical characteristics.

In the Early American house of the seventeenth century the kitchen was the center of family life. Around the huge fireplace, with its cranes and ovens, the women of the household carried on the cooking, canning, soap-making, weaving, and sewing. Here also was the scene of conversation and courting. The kitchen was the work place and the recreational area. And while the passage of the years and the influence of history and fiction have given an air of romance to the low-beamed ceilings, fireplaces, wooden bowls, copper kettles, and high benches of those days, still it must be remembered that this present-day glamour may blind us to the inefficiency and discomfort of these kitchens of our forefathers. They were primitive, and rightly so, because they were expressive of the life of those people; they could not have been otherwise.

Selecting another period at random, we discover in the nineteenth-century kitchens of our grandmothers a situation not unlike that of the early Colonists. This was the period of large families and several dependents, and there had to be work space for the grandmother, mother, and one or two maiden aunts. Our communities were not so urbanized as they are today; there was more of a rural atmosphere throughout the country. Cows, horses and pigs were more often a part of the ménage than not, and hired men were a national institution. There were many mouths to cook for, especially when the men folk came home for all their meals. This was the era of "cooked meals," of boiled dinners at the noon hour. As soon as one meal was finished some member of the family had to start work on the next, while others carried on with the canning, baking, and cleaning. It was easy to serve from the stove directly to a dining table and to linger in the warm kitchen after supper for social intercourse. The kitchen remained in the nineteenth century the center of family life. It was large and inefficient, but there were many hands to do the work.

When we speak of the modern kitchen, we cannot call it the twentieth-century kitchen, for the first quarter of this century saw only a gradual improvement in this work place. The compact, efficient kitchen of today is the product of recent efforts of architects, home economics authorities, and manufacturers of kitchen equipment. A study of management factors in housework and the ever-increasing pressure of the demand for leisure time have resulted in scientific planning. Standardized, inexpensive, and

compact cabinets, sinks, and stoves have made possible the development of these centers for the preparation of food, so unlike those of an earlier day. But again it has been the result of changing social conditions. Families are smaller and servants are few. The modern kitchen need be large enough for only one or two people. And there has been a change in the attitude toward housework. It was once woman's major interest and she expected to have little time for anything else. Now the many labor-saving devices have freed the housewife of much of the drudgery; she demands and expects that housework be cut to a minimum.

Another factor which has had an important effect upon kitchen design is the development of the commercial preparation of food. In the nineteenth century there were some commercially canned and packaged foods on the market along with the dried and root foods and green stuff in season, but the large kitchens were put to good use during the home-canning season. Now there is less need for this activity in the cities, although the practice is still desirable in the rural communities. The supermarkets of the cities and the well-equipped stores of the villages bring staples and delicacies in refrigerated, canned, or frozen form to one's very door. This is possible because of modern methods of communication and transportation. Private telephones and delivery service make possible daily supplies of fresh food if the family automobile is not available for a shopping trip. This ready access to food sources means that it is unnecessary to have large storage spaces in the urban kitchen or house. Small stocks are quite adequate for the smaller families and smaller appetites of the city dweller.

Some of these foregoing remarks apply more directly to the urban kitchen, for farm kitchens retain some of the characteristics of earlier examples. They need to be more spacious than those in the city because they must care for more diversified activities. This difference in size should not result in poor planning or uneconomical use of time or space. Rural kitchens may retain their efficiency and still serve as work, dining, and recreation areas (see Chapter 17).

Kitchen Requirements

If a kitchen is to function efficiently, considerable thought must be given to the choice of equipment and to the sequence in which it is arranged. Definite areas must be allotted to the various types of work and to the materials and stock which are to be stored. One method of classifying these areas is:

(*a*) Areas Related to Food:
1. Food-Reception Area.
2. Food-Storage Area.
3. Food-Preparation Area.
4. Food-Cooking Area.
5. Food-Serving Area.

(*b*) Areas Related to Accessories:
1. Dishwashing Area.
2. Accessories-Storage Area.

These work and storage centers should be arranged as nearly as possible in the sequence in which they are to be used. The food-storage area should be near the service door and adjacent to the reception area. It should also be near the food-preparation area so that it is only a step to the various articles of food needed for the meal under preparation. This means that the sink and its near-by counter space should be adjacent to the place where butter, eggs, milk, vegetables, and canned goods are kept. In the cooking of a meal, there is naturally considerable travel back and forth between the sink and the range. Therefore, these two pieces of equipment should also be fairly close together. It is thus as possible to route the circulation of food through the kitchen as it is to lay out the sequential arrangement of machinery in a factory, starting with dry and raw food and following it through the various processes of washing, mixing, cooking, and serving. The path of dirty dishes from the dining room back to the sink and finally to their storage space may be charted with equal exactitude. If the kitchen is so compact that unnecessary steps are saved but not so small that it is crowded and if the equipment is modern in its use and maintenance, then this particular unit of the house may be truly successful as a work center. The kitchen shown on page 175 illustrates a desirable distribution of the necessary facilities in accordance with the foregoing suggestions.

Equipment. Naturally the various work areas must be furnished with the correct pieces of equipment in order for the kitchen to be usable. These may be grouped according to function in the following manner.

Food-Reception Area. This area should be near the service entrance and should provide a counter or table space for the reception of food as it comes from the market. Here bundles, boxes, and baskets may be deposited and their contents sorted for storage in shelves, bins, or refrigerator.

Food-Storage Area. The equipment needed in this connection should consist of base cabinets for the storage of bulky food, wall cabinets for food in packages and cans, a refrigerator for the storage of perishables,

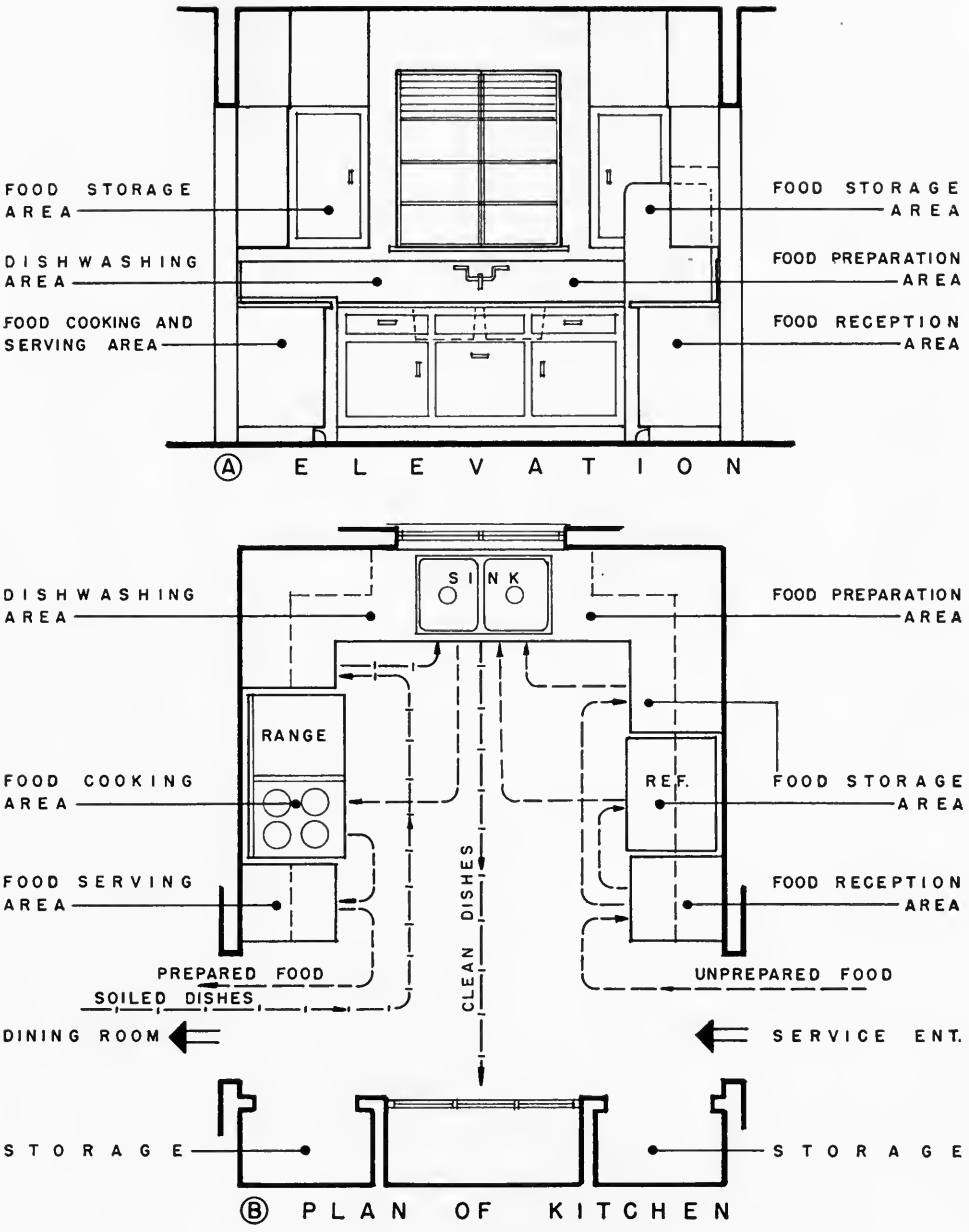
and perhaps a closet for miscellaneous items. A cool closet just outside the kitchen door is also desirable for the storage of bulky objects which may not be able to stand the normal room temperature or which may not be needed in the kitchen regularly. This also serves as a place for cooked foods to cool and as a protected space where the grocery boy can leave deliveries. In connection with the refrigerator, it should be noted that most refrigerator doors are hinged on the right side and that the food-preparation space and others in sequence should be arranged to the left of the refrigerator. If the plan of the kitchen requires that the food must travel to the right, then the refrigerator door should be hinged on the left to facilitate easy access to this storage space.

Food-Preparation Area. This should naturally be equipped with a sink and adequate counter space. There should be provision for such electrical appliances as food mixers, toasters, and percolators. The storage space to serve this area should be spacious enough to hold the various utensils for mixing and cleaning, the necessary knives and spoons, and such items as sugar, salt, flour, and spices. The tops of the counter space should be surfaced with materials capable of withstanding the cutting, pounding, and mixing processes which must be carried on here. Wall and base cabinets should be conveniently placed so that the necessary supplies may be reached without leaving the area.

Food-Cooking Area. The most important unit of equipment in this space is the range, which should be properly insulated and also vented by means of a hood or an exhaust fan or both. The utensils used for cooking, the heavy pots, pans, and skillets, should be stored in base cabinets or cupboards near the range while adjacent shelves or wall cabinets should be provided for condiments and other items.

Food-Serving Area. Provisions must be made for the proper serving of both hot and cold foods. A counter top close to the range will make for convenience in the dishing up of hot food, while some thought may be given to a space for the final arrangement of salads and desserts from the refrigerator. Storage for china and silver used in connection with serving may also be considered. It is needless to say that the serving area should be close to the door leading to the dining room.

Dishwashing Area. This may be combined with the food-preparation area, because it calls for approximately the same equipment, unless an electric dishwasher is desired. Ample counter space should be provided for stacking soiled dishes as they are removed from the dining room and for draining dishes after they are washed. The matter of the convenient disposal of garbage should also be considered.



CIRCULATION OF FOOD THROUGH A KITCHEN

FIG. 36. A U-shaped kitchen with a desirable arrangement of work areas according to use. Dotted lines show the routing of food through the kitchen to the dining room.

Accessories-Storage Area. This may include accommodations for the storage of dishes, service linen, tea towels, dish clothes, thermos bottles, waffle irons, and other miscellaneous items which may not belong too definitely to any one area. The main supply of china and tableware is often kept in a closet or pantry located between the kitchen and dining room, as in Fig. 17*A*, so that it is farther removed from the grease and odors of the kitchen.

This is a detailed list of the storage requirements in connection with the various work areas:

Articles Requiring Storage

In the Food-Reception Area

Utensils. Boxes, baskets, bags, bills, records, scales, wastebasket.

In the Food-Storage Area

Refrigerator. Milk and cream, butter, eggs, cooking fats, fresh meat, perishable fruits and vegetables, left-over cooked foods, opened cans of perishable foods, cured meats, salad oil, prepared perishable food.

Dry Storage. Fresh vegetables and fruit, canned and packaged foods, jams and jellies, relishes, vinegar and salad dressing, molasses and syrup.

In the Food-Preparation Area

Food. Spices, flavoring, coloring, yeast, baking powder, soda, flour and meal, sugar, cornstarch, junket, gelatin, tapioca, raw cereals.

Utensils. Mixing and chopping bowls, measuring cups, food grinder, electric mixer, sifters, rolling pins, dough cutters, stew kettles, boilers, sauce pans, cake decorators and molds, colanders, strainers, paring knives, vegetable brushes, baking pans and casseroles, electric percolators, toasters, wax paper, paper towels, recipes.

In the Food-Cooking Area

Food. Coffee, tea, cocoa, salt, pepper, flour for meats and gravies.

Utensils. Skillets, griddles, roaster, spatules, forks, ladles, spoons, ricer, masher, coffee and tea pots, kettle and utensil covers.

In the Food-Serving Area

Food. Bread, cake, cookies, dry cereals, wafers, crackers, sugar, jams, jellies, syrups, candy, honey.

Utensils. Bread knives and bread board, serving forks, knives, spoons, serving trays and mats.

In the Dishwashing Area

Utensils. Dish pans and drainers, cleansing powders and pads, sink strainer

and dish scraper, soap container, garbage container, dish and hand towels.

In the Accessories-Storage Area

Utensils and accessories. Everyday dishes, silver and linen, thermos bottles and jugs, aprons, wrapping paper, sacks, string, tools.

Sizes of Equipment. As the result of the cooperation among the manufacturers of kitchen equipment, the various units have become rather standardized as far as size, shape, and kind are concerned. Typical examples and measurements are shown on page 179.

Base Cabinets. These are usually provided with a counter which is about 2 feet deep and 3 feet from the floor, covered with plywood, linoleum, metal, or other durable material. There is a 3-inch recessed toe space at the bottom to permit close work, and the height of the counter may be varied slightly to accommodate tall or short workers and to help eliminate fatigue by the establishment of correct heights. The internal arrangements of base cabinets should be in accordance with the materials which they are to hold. Some may be made up entirely of drawers of various sizes, others may have shallow drawers above and doors and shelves underneath, and still others may have racks, shelves, and bins. They come in various stock widths, including those of 15, 18, 21, 24, 30, and 36 inches. Each lineal foot of cabinet contains about 6 cubic feet of storage space.

Wall Cabinets. These vary in widths in a manner similar to those of base cabinets. They are usually about 3 feet high and 1 foot deep and have three shelves, including the bottom of the cabinet. They are hung from the wall so that a space of about 18 inches exists between the bottom of the cabinet and the counter space below, as shown on page 179. A section of the wall is usually carried out flush with the cabinet, which eliminates any top to catch dust and become objectionable. There is a short size made for use over refrigerators and other tall objects, also illustrated on page 179. In the cabinets of regular height, it will be seen that each lineal foot of cabinet furnishes about 3 square feet of shelf space. Both wall and base cabinets may be made of wood, plywood, and metal, each material with its own particular price and advantages. Selection of material and color is a personal matter which can be made only after consultation and examination.

The Sink. This piece of equipment may be one of several kinds, differing according to material, size, and shape. It may be a double or single sink, separate or with built-in cabinet, or one equipped with an electric dishwasher. It may have a porcelain or metal surface and the drain board

or counter space adjoining it may be of laminated maple, porcelain, linoleum, metal, or a synthetic material. The space beneath the sink may be equipped with drawers, bins, or doors with shelves or compartments. The actual sink may vary in depth from 21 to 24 inches and in length from 22 to 30 inches. The overall dimensions, including drain board or cabinet top, may be 24 by 40 inches to 52 inches, or longer.

The Range. The range is usually about the same height as counter space or work table, that is, approximately 36 inches. Ranges vary in their horizontal dimensions slightly, the smaller ones measuring 26 inches by 40 inches, the larges ones 28 inches by 48 inches.

In arranging these pieces of equipment in a room it is necessary to keep in mind the following measurements:

Desirable Dimensions of Work Areas

Standing room	1 ft. 6 in. clear space
Working room	2 ft. to 2 ft. 6 in. clear space
Stooping for objects	3 ft. deep
Reaching for objects, vertically	6 ft. 2 in. from floor
Reaching for objects, horizontally	2 ft. 6 in. to either side
Height of work table	2 ft. 6 in. to 2 ft. 8 in.
Height of drain board and cabinet top	2 ft. 10 in. to 3 ft.
Minimum work space between equipment	4 ft.

Amount of Equipment. One of the first things which must be decided in planning a specific kitchen is the actual size of the room itself. Some indication of this was given on page 118, where it was estimated that, in the average inexpensive and medium-priced house, approximately 9 per cent of the total floor space should be devoted to this area. The size of the kitchen can be computed accurately, however, by deciding upon the character of the room, a decision based upon family interests and the sizes of the equipment necessary to maintain these interests. The amount and dimensions of the equipment are arrived at by considering the following factors:

1. The size of the family.
2. Amount and kind of entertaining normally carried on and the provisions which must be made for it.
3. The kind of fixtures desired.
4. Activities other than those associated with the preparation of food which may be carried on in the kitchen.

These are all items varying with different families, so that each kitchen becomes a special problem which is solved only after the evaluation of the needs of the specific client. However, a kitchen should not be too individualistic, for the resale value of a house must always be considered. If

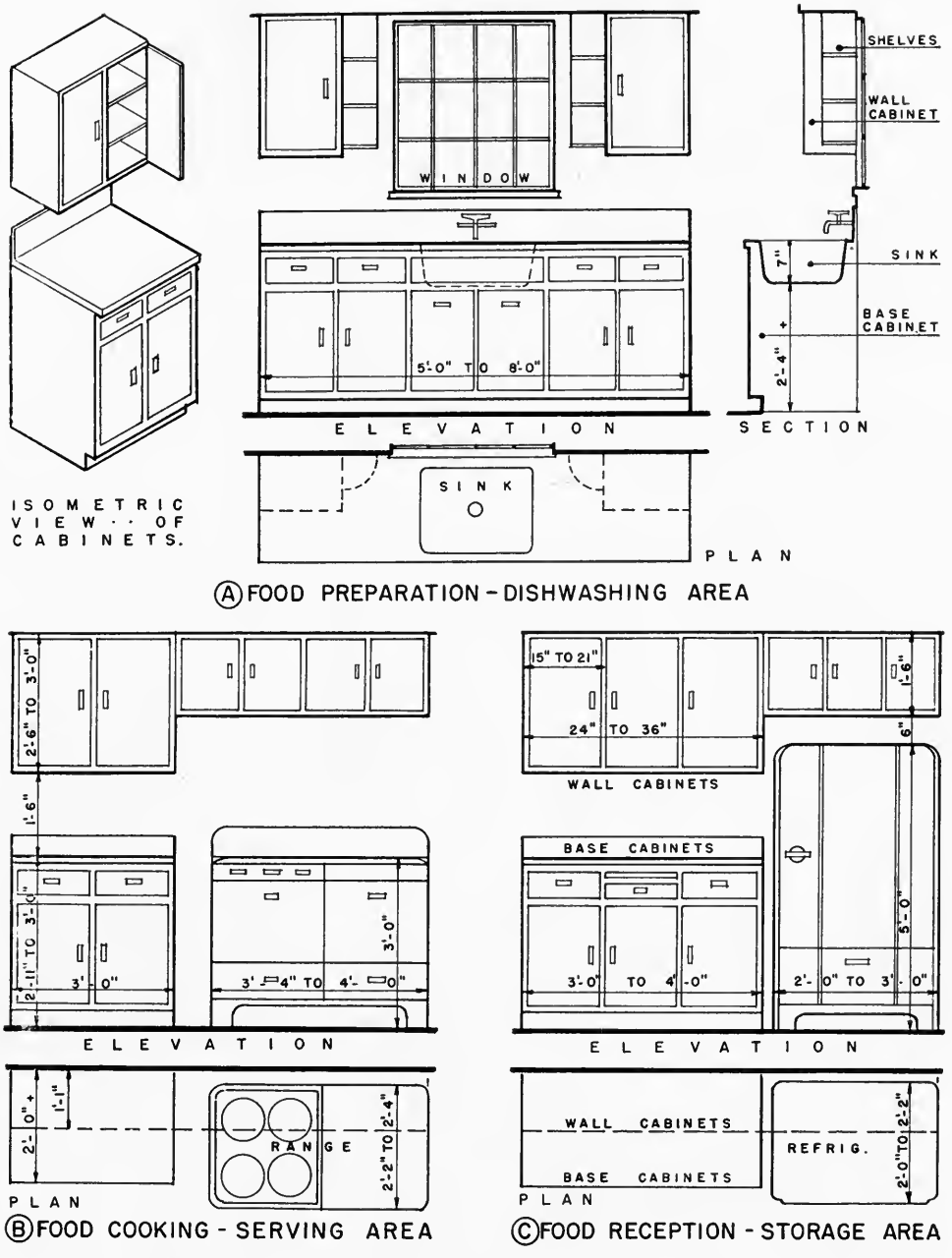


FIG. 37. Views of typical equipment for the various work areas of a kitchen. The dimensions given are the average sizes taken from popular makes of built-in and movable fixtures.

the kitchen is properly related to the size of the house and is equipped with standard fixtures arranged in an acceptable manner, it is likely to be quite satisfactory to present and future owners.

In deciding upon the actual amount of equipment needed in a kitchen, we should take into account the number of people who are to be fed from this unit. Of course most families have the same basic kitchen requirements and similar storage needs, as indicated on page 176, but there is some variation in the number of utensils, the amount of unprepared food, and the quantity of cooked food to be stored. The amount of kitchen equipment will, therefore, vary with the size of the family and with their financial status, this last item being too variable, however, to evaluate. Some authorities have worked out complete studies in this connection showing the number of base and wall cabinets needed for houses caring for families of varying sizes. The results of these studies seem to depend upon so many variable factors that it would appear to be safer to make only approximate estimates, based upon the needs of families living in the average inexpensive to medium-priced houses.

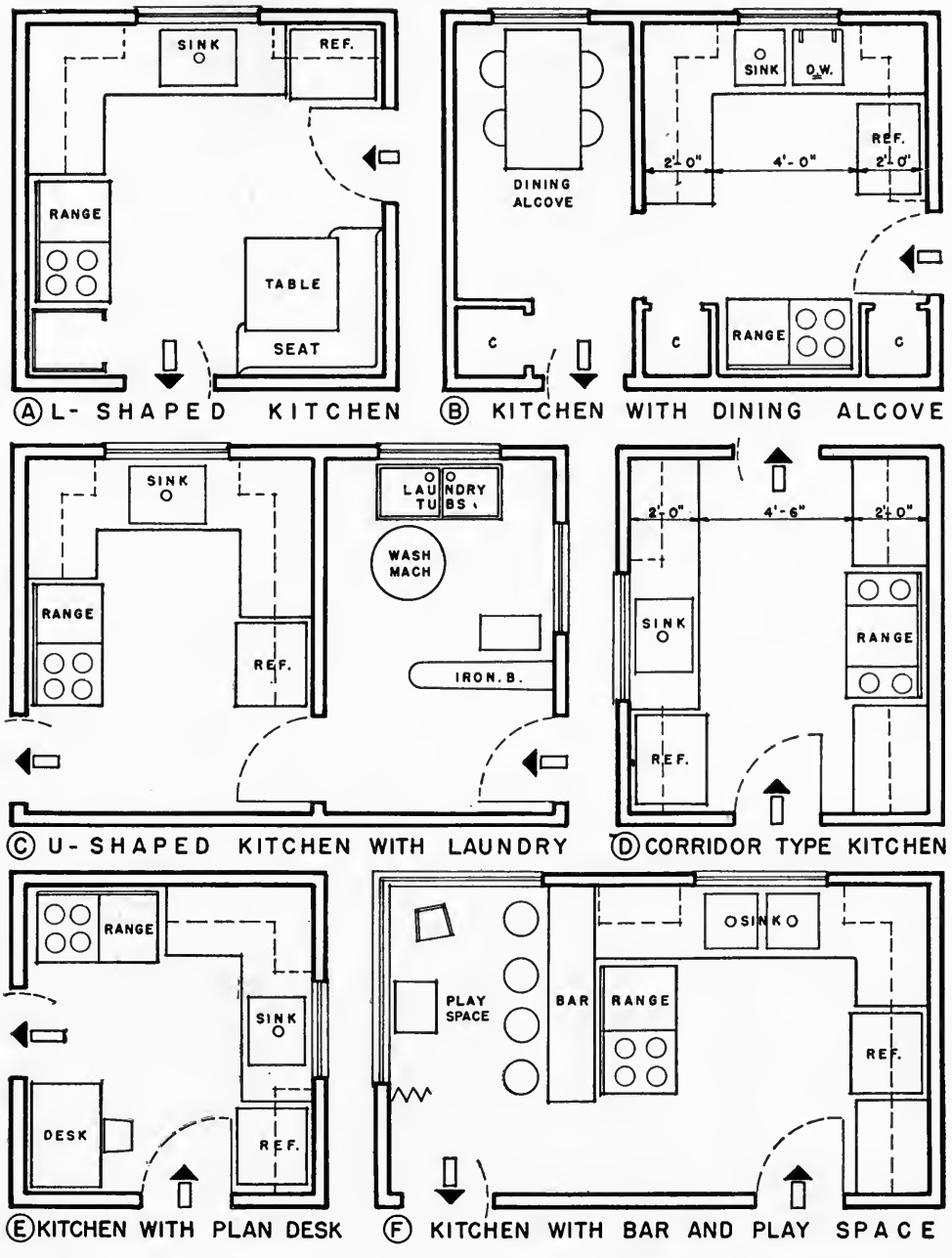
Sizes of Fixtures

Number of persons	Wall cabinet, lineal feet	Base cabinet, lineal feet	Refrigerator, cubic feet	Range	Sink, with drain
2 to 3	6	6	6	26 in. x 40 in.	24 in. x 40 in.
4 to 5	8	8	8	26 in. x 44 in.	24 in. x 48 in.
6 to 7	10	10	10	28 in. x 48 in.	24 in. x 60 in.

If the above equipment has been estimated properly and has been laid out correctly, it will be found that the average kitchen in the inexpensive and medium-priced house varies in size from 80 to 120 square feet. This is for the kitchen alone, and applies more directly to urban homes. The kitchen of the rural dwelling should be more spacious and should make greater provision for storage space, as indicated in Chapter 17. In the farm kitchen there will be more cooking, baking, canning, and other activities, and, while efficient arrangement is necessary, compactness is not such a virtue. If the city kitchen is to include within its total area places for dining, child play, or visiting, additional square feet must be added to the previous estimate. In addition, some provision should also be made for one or two small closets for brooms and miscellaneous items and also for a general storage closet.

Types of Kitchens

It will be found that the general shape of the kitchen is largely determined by the character of the first-floor plan, but the designer can keep a



VARIOUS TYPES OF KITCHEN ARRANGEMENTS

FIG. 38. Suggested plan types showing basic arrangements and also possible combinations of standard kitchen facilities with other activity areas and their equipment.

definite type in mind and try to find a place for it in his or her layout. The location of doors and windows will have a great deal to do with the kind of kitchen which develops. These openings will govern the placing of fixtures and the route of traffic through the room. Kitchens may be classified as follows, in the order of their preference:

1. U-shaped kitchens.
2. L-shaped kitchens.
3. Corridor-type kitchens:
   two-wall.
   one-wall.

The U-shaped kitchen is the most desirable because it is the most compact and also because the work space is not traversed by the traffic flow through the kitchen from door to door. In a layout of this kind the food-preparation and dishwashing area together with the sink are placed at the bottom of the U. The food-storage area and refrigerator are located on one side of the U, and the cooking and serving area may be on the opposite side. In this arrangement the window is usually at the end over the sink so that none of the necessary wall cabinets will be eliminated. The service door and the door to the dining room are then located in or near the end of the room opposite the window, as shown on page 175, and should be hinged so that they open back against the wall in order that they may not interfere with the work centers.

The L-shaped kitchen has its equipment arranged along two major walls at right angles to each other in a manner similar to the kitchens illustrated on pages 181 and 184. The room itself may be L-shaped, or the work area may assume this shape because of the introduction of a dining unit. This type is satisfactory in its layout, but traffic through the room is more likely to encroach upon the working space than in the U-shaped kitchen.

The corridor-type kitchen is the least desirable because of the interference of people passing through the entire length of the room itself. In addition it is not nearly so compact as other shapes and requires more travel back and forth in the preparation of a meal. This is evident from a study of the plans on page 181. The one-wall corridor type is probably the worst offender from the standpoint of efficiency because the refrigerator is likely to be at one end of the line of equipment and a considerable distance from the range at the other.

In addition to the above-mentioned standard types, there are a number of novel and practical variations of these arrangements. A few of these may be seen on page 181. Most of these unorthodox types are caused by the

General Electric Co.

FIG. 39 (*above*). *Before.* A poorly planned kitchen uneconomical of time and effort.
FIG. 40 (*below*). *After.* The same kitchen replanned. Better sequence of work and storage areas.

General Electric Co.

FIG. 41 (*above*). Modified L-shaped kitchen with a planning desk near the window.
FIG. 42 (*below*). Unique arrangement with range in center of room adjacent to dining nook.

General Electric Co.

FIG. 43 (*above*). A personal type of kitchen treatment with paneled cabinets and tile wainscot.
FIG. 44 (*below*). A spacious, friendly kitchen with facilities for informal dining and visiting.

introduction of a dining nook, a breakfast bar, a play space for the baby, or a place for the housewife's desk where she may write menus, list the morning grocery order, or record new recipes. Many interesting solutions may be secured by projecting the sink, or range, with perhaps a counter above, out into the room at right angles to the wall to provide service for kitchen or regular dining. This arrangement is illustrated in Figs. 38*F* and 42.

The correct size and arrangement of the kitchen will contribute to the ease with which kitchen work may be done. Time and motion studies have shown that a poorly planned kitchen necessitates at least twice as many steps in the preparation of a single meal as are required in a more efficiently arranged work area. The "before and after" kitchen shown on page 183 illustrates both types. The difference in the number of footsteps and the resulting fatigue are evident from a study of these photographs. The design of a modern kitchen is not an architectural problem alone. The work activities discussed in Chapter 25 are of equal importance, and architects, students of architecture and home economics, and laymen alike should make sure that there is the proper collaboration between these various phases of kitchen planning.

Chapter 20

AREAS RELATED TO THE CONSUMPTION OF FOOD

The Scene of Dining

The scene of that activity which we politely call dining has shifted back and forth between the kitchen, dining, and living areas during the history of our country. After it left the combined kitchen and living space, the formal dining room came into existence and has fluctuated in its importance as the center of family life. Until comparatively recent years, the dining room was often the largest and most-used room of any in the living quarters. This continues to be the case in many rural homes. The parlor was small and formally furnished. It was the show place and reserved for guests. When cousins or uncles dropped in to spend the evening, they joined the family around the dining-room table, where father was reading, mother was mending, and the children were studying. It was more convenient and comfortable to remain in an already-heated dining room than to retire to a cold bedroom for study or to the rather depressing parlor for conversation. The mechanization of the house had not yet begun.

But with the development of the parlor into the living room, the dining room lost its importance in use but retained its position and size. In city homes, its air of informal livability with its work basket, sewing machine, magazine stand, and children's toys gradually disappeared and it became as formal as the parlor had been. And now, in urban homes, another change is taking place. This dining area is often merging with the living space, or, if not, is becoming an informal livable room, flexible enough to be devoted to more than one activity.

The future of the dining space in city houses will naturally depend, in the years which are to come, upon our attitude toward eating. Man's demand for food must always be satisfied, but by what methods will this be accomplished? What effects will the contributions of occupations, medical science, and personal inclination have upon our eating habits? Will eat-

ing become, in general, a scientific process using concentrated tablets containing the correct number of calories—human beings fed like plants grown in the water tanks of a laboratory? Or shall we continue to eat substantial meals; some in a hasty and a casual manner, others in a leisurely and formal way, enjoying the sensuous qualities of food as true gourmets? This less scientific attitude seems to be more likely and certainly more interesting and pleasant.

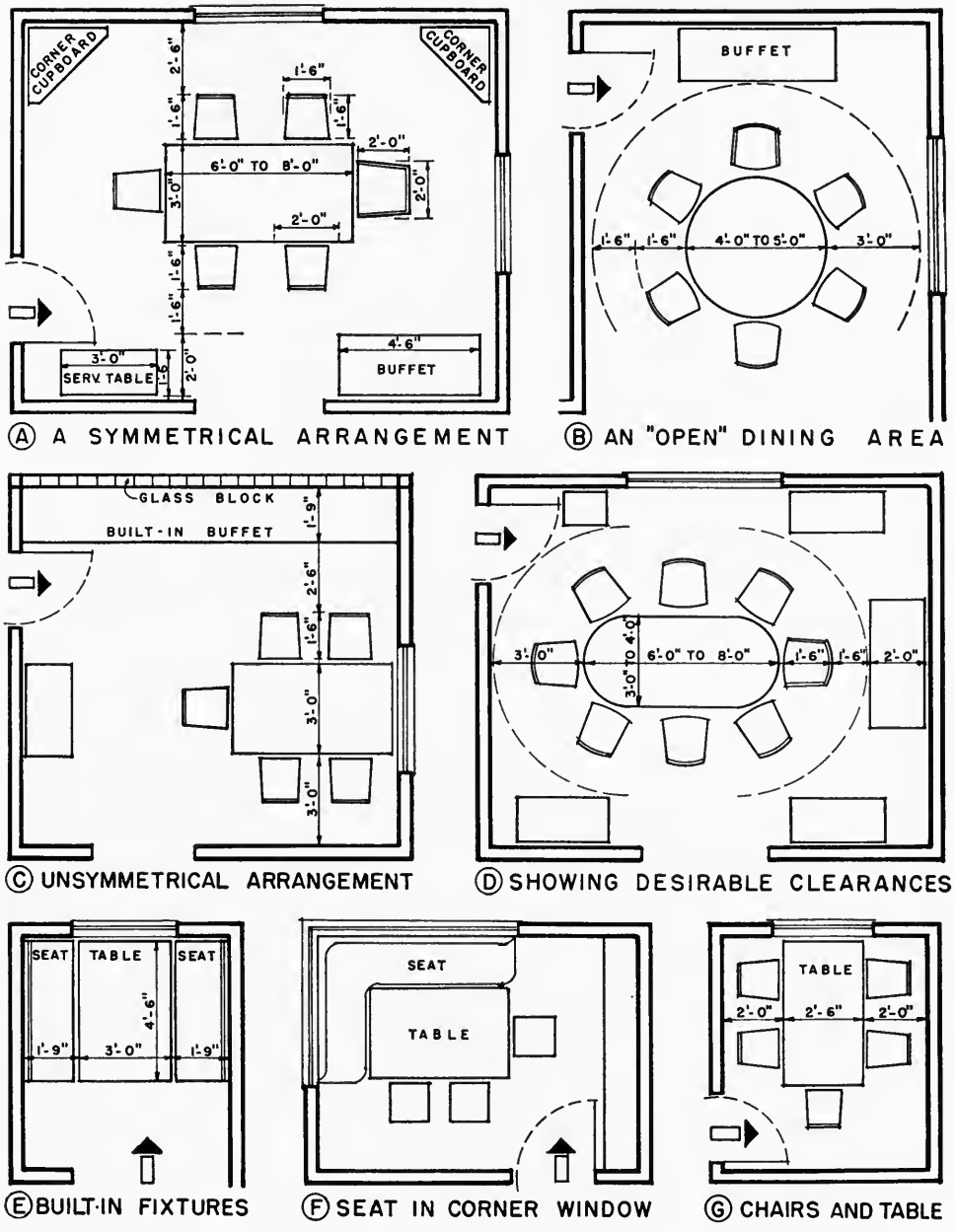
We must deliberately plan for all types of meals. In the rush to get to work or to an engagement, some meals must be eaten quickly and provision must be made for these occasions. A dining alcove or breakfast bar close to the food source seems to be a desirable solution. To compensate for those meals eaten hastily, at home or in a sandwich shop, there should be opportunities for the unhurried enjoyment of food. House designers should provide for these with simple dining areas pleasantly environed with cheerful furniture, proper sunlight, and interesting vistas. Outdoor dining when climate will permit should be made possible as a stimulation to appetites and good fellowship.

Dining in the country is likely to be less hurried than in the city home. Most of the members of the family are usually present for the major meals, and meal time is an interlude in the day's work activities. A rural dining area is primarily functional—a physical setting for the consumption of food. Utility is paramount; appearance is important but secondary.

The current uncertainty about the character and location of the dining area is rather confusing. There seems to be no doubt that food for modern man has always been prepared in the kitchen, and will probably continue to be; but the most desirable place for its consumption is, as we have indicated, a debatable subject. The food of primitive man was cooked over a fire and eaten in any near-by location. And so with modern man—dining may take place anywhere from the kitchen to the living room or the porch. It all depends upon the inclinations of the occupants, and, before we can plan dining areas, we must inquire about the eating habits of the people who are to occupy the house.

1. What types of meals do they usually serve?
2. Are they ceremonial, casual, leisurely, or hurried?
3. Are all members of the family present for all meals or for only part of them?

The answers to these and similar questions should help determine what kind of dining area should be provided for a specific family. Decisions concerning such matters are likely to be influenced by that ever-present



TYPICAL DINING AREAS AND FURNITURE GROUPING

FIG. 45. Plans showing various types of dining rooms and dining alcoves together with sizes and arrangements of furniture for formal and informal compositions.

warning about "resale value," which, of course, is not to be disregarded. However, it is sometimes an unreliable criterion by which to judge, because present-day values may not be used a decade from now in determining the worth of a house.

Types of Dining Areas

The various types of dining areas in current use may be summarized as follows:

1. Formal dining room, separated from the living room by a hall.
2. Formal dining room adjacent to the living room and connected by a door or opening.
3. Dining space in one end of the living room.
4. An area opening off the living space but belonging definitely to it.
5. Dinette or breakfast room next to the kitchen, sometimes serving as a buffer between the kitchen and the dining or living area.
6. An alcove or corner of the kitchen set aside for dining.

In houses other than the very inexpensive, it may be possible and desirable to include more than one of the above arrangements. A formal dining room may be supplemented by a dining alcove in or near the kitchen for those hurried meals and midnight snacks which do not belong in the regular dining area. If all the meals must take place in the dining room, it means a complete and lengthy cycle for each meal, involving:

1. Removing the decorative centerpiece.
2. Laying linen and placing china and silver.
3. Bringing food from kitchen.
4. Clearing table after the meal.
5. Resetting decorative centerpiece, and putting room in order.

If this is done only once a day for the evening meal—which should be somewhat of an event because it brings the entire family together at one time—it may not be too much of an effort. If it must be repeated three times a day, it may become a monotonous task for the housewife. Naturally the number in the family who may help with this chore or the presence of servants will modify this point of view. The work connected with serving meals in the breakfast room is usually relatively negligible. The area is close to the various work centers of the kitchen so that few steps are necessary in placing the meal. The floor and perhaps the wainscoting are often of linoleum or some material which does not soil easily, and the room is usually without rugs. Thus maintenance is easier than in a regular dining room. The dining alcove is likely to be a utilitarian area rather than a dis-

play space and it does not have to be dressed up as does the formal dining room. Alcove dining is thus simple and easy. It is quite possible that an attractive dining alcove may entirely supplant the dining room, so that the major units on the first floor would consist of the kitchen, dinette, and living room.

Equipment. The results of numerous surveys have shown that dining rooms are somewhat standardized in size, and are designed to fit the orthodox types of dining-room furniture. The average size is approximately 12 feet by 14 feet, with 10 feet by 12 feet being considered the minimum for comfort, and 13 feet by 15 feet being regarded as quite adequate and satisfactory for medium-priced houses. In very modest houses, dining rooms may be as small as 8 feet by 10 feet, especially if they are open to another room on one side. In rooms of the average size are placed the following pieces of furniture, which are assumed to be the minimum:

1. Dining table, rectangular, round, or oval.
2. Six chairs.
3. Buffet, for display of decorative accessories, and for the storage of table linen.
4. China cupboard, for display and storage of the best dishes and silver.

In contemporary, streamlined interiors, the last two items may be built in, with shelves and drawers behind sliding, or flush panels, or hidden by some other arrangement in line with the occupants' inclinations and taste. To the foregoing list may be added such articles as a serving table, a chest of drawers, a tea wagon, and a desk, the inclusion of these depending upon the size of the room and the interests of the family. The average dimensions of the various pieces of furniture are shown in the following table:

Dimensions of Dining-Room Furniture

Tables	
Rectangular	3 ft. to 3 ft. 6 in. × 4 ft. to 6 ft.
Refectory	2 ft. 6 in. × 5 ft. 6 in.
Round	4 ft. 6 in. to 5 ft. 6 in. diameter
Chairs	
Side	1 ft. 6 in. × 1 ft. 6 in.
Arm	2 ft. × 2 ft.
Buffet	1 ft. 9 in. to 2 ft. × 4 ft. 6 in. to 6 ft.
China cupboard	1 ft. 6 in. × 3 ft. 6 in. to 4 ft.
Serving table	1 ft. 6 in. × 2 ft. 6 in. to 3 ft. 6 in.
Chests	1 ft. 6 in. × 3 ft. 6 in. to 4 ft.

If the dining room is to be used for home study or for games, in addition to meals, the orthodox type of dining-room furniture is not desirable, and more comfortable and less formal equipment should be selected.

General Electric Co.

FIG. 46 (*above*). A formal dining room adjacent to the living room.

West Coast Lumbermen's Assoc.

FIG. 47 (*left*). Breakfast room with cedar-paneled walls and parquet flooring.

W. & J. Sloane

FIG. 48 (*above*). Dining room in non-traditional manner. Walnut furniture.

Owens-Illinois Glass Co.

FIG. 49 (*right*). Dining alcove with glass-block walls. Metal furniture.

Arrangements. Many families still prefer a formal arrangement of furniture within the room, with the table in the center surrounded by chairs and the other pieces arranged against the available wall spaces in the most interesting manner. The buffet is usually placed against the longest wall area, while the cupboard, chest, and other articles are left to shift for themselves. And too often that is exactly what happens! The dining room develops most casually as a result of its position in the general plan, and usually the doors and windows and resulting wall spaces are not satisfactorily placed. Although the exterior appearance of the house must be considered, the locations of walls, furniture, and openings must all be studied together. The interior should be designed before the exterior. If the service door from the kitchen is located near a corner of the dining room, it will open back against a wall and leave a large wall space for the placing of an important piece of furniture. The room should be planned to accommodate the necessary articles of furniture. It is very embarrassing to find that a wall space is too short to receive the buffet which must be placed there, or that a high, horizontal window is too low for the item of equipment which was to be set under it. The plans shown on page 189 indicate some of the various types of dining rooms and areas and the furniture arrangements which may result. The dimensions on the plans and in the following table are not minimum but are those considered desirable for the average home.

Dimensions in Dining Space

Distance between edge of table and back of occupied chair	1 ft. 6 in.
For comfortable passage	
Between chair and low furniture	1 ft. 6 in.
Between chair and high furniture or wall	2 ft.
In general, there should be at least a 3 ft. or 3 ft. 6 in. passage between the edges of dining-room tables and major obstructions	

It is a conspicuous fact that less thought has been given to the location of the dining room and its orientation with reference to view, sun, and breezes than to the location of some of the other rooms of the house. As a result, dining rooms of the past have often been dismal, stiff, and uninteresting. However, with modern concepts of living, the dining room is taking a new lease on life. Designers realize that a pleasant view, a window with flowers, a cooling breeze, a cheerful winter sun, or access to a shaded dining terrace are desirable features which should be related to the place where meals are taken. Cross ventilation to catch the prevailing winds in

Western Pine Assoc.

W. & J. Sloane

FIG. 50 (*above*). Colonial dining room with plank flooring, wood wainscot and papered walls. FIG. 51 (*below*). Conventional arrangement of furniture. Pink and white paper, plum upholstering.

the summer and the maximum amount of light in the winter are subjects to be given serious consideration.

The dining alcove in the kitchen is illustrated on pages 181 and 184. Usually the built-in or movable furniture is reduced to the minimum size in order to keep the size of the kitchen down to an area which does not become unwieldy. If the necessity for compactness within the alcove itself is not too pressing, it is desirable to allow more than the minimum dimensions for furniture clearances in order to provide additional comfort in connection with use and maintenance.

The dinette or dining alcove separate from the kitchen is a feature which adds much to the livability of a medium-sized house. It may be a gay, informal little room, as seen in the photograph on page 192. It may have built-in shelves, window boxes, and perhaps a view of a flower garden. It may be equipped with stationary benches and table, or with movable furniture as shown on page 189. The latter is often more desirable for several reasons: the furniture may be more interesting, it can be used elsewhere on occasion, it can be removed for cleaning, and it may be more comfortable.

There are no standardized furniture arrangements when dining is carried on in the living room or in an alcove or area opening from it. The furniture should harmonize with that of the living room and should be placed in an informal manner so that the transition from dining to living may be easy and practical. A small table in an alcove may be large enough for family meals and may be opened and extended into the living room for party meals, as indicated in the plan on page 126. If the housewife does not want the guests to watch the setting and clearing of the table, a screen or curtain may be designed and placed for the specific purpose of hiding this informality connected with a meal. A large bay window overlooking a terrace or lawn is ideal for the location of a table for the combined function of dining and living.

Outdoor dining does not lend itself to any particular type of equipment or arrangement, but this informality makes for flexibility and interest. Ample provision should be made for dining on a porch or terrace, especially in those climates which are mild enough to encourage this pleasant activity. The porch should be located near the kitchen in order to make service convenient and simple. It should be placed so that it is screened from the street and the neighbors, in order that privacy may be insured. Thought should also be given to the position of this part of the house with reference to the sun, wind, and trees. Provisions for outdoor dining are illustrated on page 168.

Chapter 21

AREAS RELATED TO SLEEPING

THE SCENE OF SLEEPING. Sleeping as a bodily function remains unchanged, although ideas about the time, amount of, and physical setting for sleep vary with the environment. The old-time bedroom was cold in winter and hot in summer. It was poorly lighted and ventilated and provided very little storage space. Its bare necessities—a bed and dresser—were placed wherever wall space could be found, and much was left to chance. Bedrooms now have more privacy, and considerable thought is given to prevailing breezes, adequate light, and comfortable furniture. There was an earlier time when bedrooms were tucked away under the roofs of our farm and small-town houses, with insufficient head room and light. Now most of our houses with an upper floor have a full second story providing for better bedroom space. A conspicuous exception to this is the ever-popular Cape Cod cottage with its charming exterior but often inconvenient second floor. Here the ceilings are usually clipped to follow the pitch of the roof, and light and air are admitted by dormer windows. The interior effect is interesting and informal but the ceilings are sometimes oppressively close. In order to eliminate this condition, a false dormer is often extended the full width of the house across the rear which gives an awkward appearance to the house when seen from any position other than the front.

The bedroom is occupied perhaps more than any other one room in the house. In no other area do we spend as much as eight hours a day. However, the fact that we are asleep much of the time we are in the bedroom may be the reason why so little thought—except that concerned with the housewife's decisions about color schemes—is given to the planning of this room. Too often it is just a squarish kind of a room with one or two windows and a closet equipped with a rod and some hooks to hold clothes. So much of our physical well-being depends upon undisturbed rest that the bedroom merits as much study as any of the other rooms of the house.

The well-planned bedroom is a scientifically equipped unit with a definite relationship to storage areas, baths, and dressing rooms. This is all a part of the contemporary importance attached to the health-producing benefits of sound sleep. In a successful home, all precautions must be taken to insure unbroken rest for at least the minimum number of hours required by various individuals.

Needs and Arrangements

Before attempting any planning, we should analyze the interests and idiosyncrasies of the individuals who are to occupy the bedrooms. We should reinforce our efforts with all the contributions which science has to offer for the encouragement of comfortable sleep. We should find the answers to such questions as:

1. What kind of beds are desired? Double, three-quarter, or twin?
2. Should provisions be made for reading in bed? for a radio at the bedside?
3. What other kind of bedside equipment is needed?
4. Is there any special kind of lighting required?
5. Is the occupant especially sensitive to light? wind? noise?
6. Will the bedroom be used as a sitting room or a study?
7. What pieces of furniture are desired?
8. Are dressing and sleeping rituals, or activities which are taken very casually?

Equipment. It goes without saying that the bed is the only really essential piece of furniture in the sleeping quarters, but, for the sake of convenience and to meet the demands of common sense, other items must be added. The average bedroom should contain, as its minimum requirements, a bed, dresser, bed table, and two straight chairs. To these may be added such pieces as a chest of drawers, a dressing table, an easy chair, a chaise longue, and perhaps a desk—the selection and number depending upon the size of the room and the inclinations of the occupant. These requirements may be modified somewhat by the use of built-in equipment, such as seats, drawers, cupboards, and mirrors. The important thing to keep in mind is the necessity of providing the correct amount and kind of furniture to care for the normal activities of sleeping and dressing and for the storage of clothing. The dimensions of typical pieces of furniture are shown in the list on the opposite page.

Size of Room. It is difficult to arrive at any standardization of bedroom sizes, because practice varies in different parts of the country and is affected by the number of people who are to occupy the room. The so-called

Sizes of Bedroom Furniture

Beds	
Single	3 ft. × 6 ft. 6 in.
Twin	3 ft. 3 in. × 6 ft. 6 in.
Three-quarter	4 ft. × 6 ft. 6 in.
Double	4 ft. 6 in. × 6 ft. 6 in.
Bed tables	1 ft. to 2 ft. square
Dressers	1 ft. 6 in. to 2 ft. deep × 3 ft. to 4 ft. wide
Chests	1 ft. 6 in. to 2 ft. deep × 2 ft. 6 in. to 4 ft. wide
Dressing tables	1 ft. 6 in. to 1 ft. 10 in. deep × 3 ft. to 4 ft. wide
Bench	1 ft. 6 in. × 2 ft.
Chairs	
Boudoir	2 ft. 6 in. × 2 ft. 6 in.
Side	1 ft. 6 in. × 1 ft. 6 in.

bunk rooms, now popular with imaginative boys, may be as small as 8 feet by 8 feet; but these are special cases and should not be used to influence the average. Health authorities have set a minimum of 50 square feet per person in any of the major rooms of the house. This figure would apply only to the "minimum house," since a bedroom of 100 square feet, or one which is 10 feet square, is hardly ample for two people unless financial considerations permit nothing more spacious. In the medium-priced houses, it has been found that for one person a bedroom approximately 10 feet by 11 feet is considered small enough, while 11 feet by 13 feet is more desirable. For two people a room 12 feet by 14 feet is found to be the average. Occasionally bedrooms are as large as 14 feet by 20 feet, but this size is sometimes wasteful of space. It may occur because of the demands of the occupant but often is the result of the position of the bedroom above a living room of the same size. Here the position of the stairway may prevent a flexible second-floor plan, and the area is too small for two rooms and too large for one room. This is a reminder of the influence of the first-floor plan upon the layout of the second floor. Frequently minor changes may be made in the first-floor arrangements which will permit better sizes, proportions, and locations of the bedrooms.

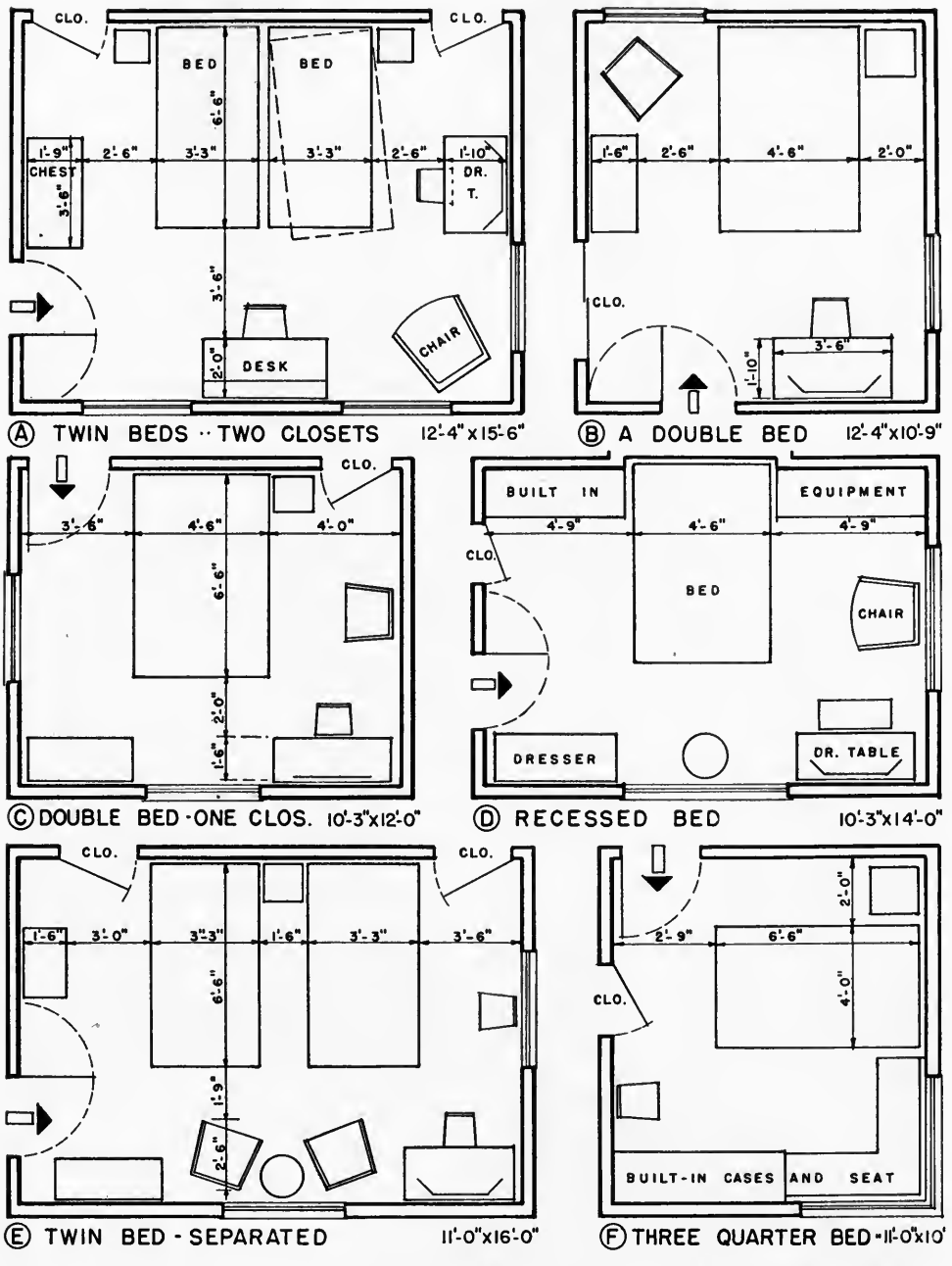
The area which may be given over to sleeping quarters can also be computed in accordance with the method described on page 118. If this is followed, it will be found that three bedrooms may occupy 35 per cent of the total floor space of the entire house. It must be remembered, however, that this is only an average and may be varied to meet the needs of individual families.

Furniture Grouping. Because of its size and function, the bed—and its accompanying night table—forms the center of interest in the bedroom. If the room is large enough, the bed should be placed in a free standing

position, so that it is not necessary to pull it out in order to make it in the morning or arrange it at night. This often places the head against an inside wall in a central position in the room, which leads to a balanced arrangement of the furniture. The wall may even be recessed slightly to receive the bed and the area may be equipped with cases for books and magazines or shelves for a radio and other accessories, as in Fig. 52*D* and Fig. 55. Special lighting may also be included in the scheme. The result may be a beautifully composed interior and one which is highly satisfactory most of the months of the year. However, during the summer, the sleeper may be facing the windows with the bright morning sun, to which he may be particularly susceptible. Or, in the Middle Western States, he may wish to pull his bed closer to the window in order to catch the maximum amount of cool night breeze, only to be discouraged by the formal and permanent composition of the bedroom furniture. One often sees clever arrangements of built-in bedroom equipment which are quite satisfactory unless climatic conditions render them less desirable. Another disadvantage of some built-in furniture is the difficulty with which they may be reached for servicing. Some of these ideas have been borrowed from Scandinavian countries where servant help is cheap and plentiful and are not always directly applicable to our own conditions.

If the bed has to be placed in the corner of the room, a few inches should be allowed on the far side and at one end so that the housewife or maid can get to it easily in connection with the daily task of bedmaking. Nothing is more disastrous to a woman's back and the floor's finish than the dragging of a bed back and forth twice a day. For this reason the separation of twin beds by a night table in Fig. 52*E* is an arrangement superior to that shown in Fig. 52*A*.

After the bed has been correctly located, the other pieces of furniture may be placed around the room with proper regard for the sizes and proportions of wall space and for circulation through the area. This sounds like a very general statement, but there seems to be no particular system for the location of furniture, except that which grows out of the function of the room and the rules of good composition. However, some typical plan arrangements, together with desirable dimensions, are shown on page 201. The larger pieces should usually be distributed about the room so that no one portion appears to be crowded. There should be an effort to secure balance of form, size, texture, and color, either in a symmetrical or unsymmetrical manner. Closets and chests for clothing should be conveniently located, and provisions should be made for dressing near these storage centers. The closets in Figs. 52*B* and 52*F* are more accessible than the



TYPICAL BEDROOM ARRANGEMENTS

FIG. 52. Illustrating various ways in which bedrooms may be designed around different pieces of furniture, or furniture may be related to walls, doors, and windows.

Western Pine Assoc.

W. & J. Sloane

FIG. 53. (*above*). Bedroom with pine paneling and furniture. Simple and honest. See Fig. 66.
FIG. 54 (*below*). Formal Sheraton treatment. Pink wall paper, plum carpet, blue and plum fabrics.

General Electric Co.

W. & J. Sloane

FIG. 55 (*above*). Recessed twin beds with built-in illumination. Formal type of treatment.
FIG. 56 (*below*). Informal composition. Sycamore and poplar burl furniture. Non-traditional.

one in Fig. 52*C*, which requires circulation through the entire room. Ample mirrors and illumination are to be considered essential to a successful bedroom. Doors should not swing out into the room in a way to hide part of the interior or to interfere with the use of articles of furniture, but, on the contrary, should open back against a wall space. It is only by the consideration of these and similar small items that efficient planning can be attained. Desirable clearances are shown below:

BEDROOM CLEARANCES

Between bed and wall	
for making bed	1 ft. 6 in.
for night table	1 ft. 6 in. to 2 ft.
at foot of bed	2 ft.
Between twin beds	1 ft. 6 in. to 2 ft.
Between furniture or furniture and wall	1 ft. 6 in. to 2 ft.
Between face of drawer space and other piece of furniture	2 ft. 6 in.
Between furniture and wall	2 in.
Between pieces of furniture	4 in.
Traffic lanes	3 ft. wide

THE FUTURE. The laboratory-like kitchens of contemporary houses are certainly much different from those of a few decades ago, so perhaps it is not too much to assume that our bedrooms are due for the same rejuvenating process. Instead of simply growing out of rather commonplace divisions of the second floor, they can be planned scientifically for the physical function of sleeping. Perhaps science will soon come to the rescue and change our entire conception of the sleeping space. Until that time, we can, at least, institute a few architectural innovations. Does the bedroom have to remain a single square or rectangular unit, or can it not be divided into two areas? There are two steps connected with sleep—the changing of clothing and the act of sleeping—so why not two rooms? We now dress, undress, read, and sleep in the same space. We undress in a warm room, cool it, and retire. In the morning we awake in a cold room, which must be reheated while we dress in a much-demanded bathroom. This does not seem economical of heat or space. Sleeping rooms are sometimes used as auxiliary sitting rooms, requiring special furniture unrelated to beds. Also the sunlight which is cheerful in the bedroom during the day is not so welcome in the early morning. And thus compromises must be made—the bedroom is a hybrid, not entirely satisfactory for either sleep or quiet relaxation. There should be some way of designing a scientifically correct "space for sleeping" which would be conditioned physiologically and psychologically for the purpose of securing complete rest. This room would be small—just large enough for a utilitarian but comfortable bed and serv-

ice table. It would be soundproofed as much as is practical, and would be cooled, heated, and artificially lighted in the latest approved manner. It would be dark upon occasion but cheerful when desired. It would be a laboratory for sleeping! Adjacent to this unit would be a small sitting-dressing room which would function very much as the ordinary bedroom does now in all respects except for the actual act of sleeping. These two rooms would not exceed the area of the usual large bedroom, so that the same economy of space could be maintained. If anyone objected to this arrangement on the grounds that a sense of spaciousness was lost, this could be overcome by the use of sliding glass or wood panels or heavy curtains between the two areas. At least, thinking along this or similar lines is to be encouraged. If we become dissatisfied with our standardized bedroom, new ideas may be developed. Progress rather than stagnation may result.

While the majority of present-day bedrooms retain traditional shapes, considerable advance has been made in the simplification of furnishings, which have been streamlined, like the kitchen, living room, and bath. Furniture is more utilitarian and is reduced to the essentials. Interesting textures contrast with plain wall surfaces, as shown on page 237. More effort is being made to relate a bedroom to an interesting view for daytime occupation, or to a second-floor terrace for evening enjoyment. The placing of windows has undergone marked changes. Instead of regularly spaced windows in the centers of wall areas, the large corner window or an expanse of glass for an entire wall is a favorite solution of the problem of light and vision. Most of these innovations are desirable features, but they should be scrutinized in relation to local conditions. A large window presupposes privacy from that side and a worth-while view in that direction. It may have certain advantages or disadvantages with different climates or seasons. A particular type of bedroom and its accompanying windows, balconies, and terraces may be very satisfactory in the South and quite impractical in the Middle West. Geography should never be divorced from architecture.

Chapter 22

AREAS RELATED TO SANITATION

Bathrooms

Ever since our pioneering forefathers took their Saturday night baths in the kitchen by the uncertain warmth of the cook stove, there has been a gradual improvement in these facilities, until now the bathroom is as scientifically planned and as efficiently equipped as the modern kitchen. In fact, the two have kept step with each other and are leading the way in the matter of home planning.

Before we design bathrooms, we should inquire into the toilet habits of the specific family which is to occupy the house.

1. Is there a morning rush or is the demand spread over a longer period?
2. To what extent is the bathroom used during the day?
3. What are the evening requirements?
4. What special demands are made on the bathroom?
5. What is the attitude of the family toward washing and bathing?
6. Is this process of keeping clean pursued merely for the sake of cleanliness or is it a fastidious ritual?

Generally mere cleanliness is typical of men while fastidiousness characterizes many women. A successful bathroom must reconcile both the masculine and feminine points of view, along with meeting other requirements. The size and cost of the house, together with the wishes of the owners, will be the determining factors in arriving at the dimensions and nature of the bathroom. In most small and medium-sized homes, compactness is a desirable quality; but the idea should not be carried too far. The saving in space at a few cents a cubic foot may result in permanent annoyances which may detract from the anticipated pleasure expected from a new house. Ease of circulation and adequate space for general bathroom activities are more essential than a slight saving in the total cost of the house.

This matter of space demands careful consideration. If necessary, inexpensive but durable materials and construction should be used in order to put the saving in cost into the securing of a "living space." The extreme in compactness should be reserved for those apartments in the city, where land values are high, and for those whose occupants spend only a short time each day in these minimum cubicles. This country is still rich in space in which to build and has not yet reached the saturation point, where the Pullman-like bathrooms, kitchens, and bedrooms—advocated by some contemporary disciples of compactness—are necessary. Equipment and rooms may sometimes be too large, which is wasteful of space and effort, but this is not so annoying as crowding and congestion. Man reacts quickly and unpleasantly to the lack of "elbow room," and the bathroom is one place where this most frequently happens.

Size and Types. It has been found that a space about 5 feet by 7 feet is satisfactory for the average bathroom in an inexpensive or a medium-priced house. If the absolute minimum is required, a space 5 feet square will suffice, as shown in Fig. 57*B*. In the average house a floor area of 40 to 56 square feet will take care of the three basic fixtures—toilet, lavatory, and bathtub—without crowding. Some of the possibilities in the arrangement of these pieces of equipment are shown on page 209. If other fixtures, such as a separate shower or a dressing table and bench, are desired, additional space must be provided.

Sizes of Sanitary Fixtures

Bathtubs	2 ft. 6 in. to 3 ft. wide × 4 ft. to 6 ft. long
Lavatories	
Wall type	1 ft. 3 in. to 1 ft. 8 in. deep × 1 ft. 6 in. to 2 ft. long
Pedestal	1 ft. 8 in. to 2 ft. deep × 2 ft. to 2 ft. 6 in. long
Toilets	tank, 1 ft. 10 in. to 2 ft. wide; projection of bowl from wall, 2 ft. to 2 ft. 6 in.
Showers	2 ft. 6 in. to 3 ft. 6 in. square

It will be noticed, in the plans on page 209, that the location of the tub is the controlling factor in the arrangement of the elements. A good arrangement is to place the tub against an inside wall, as shown in Fig. 58. When the tub is under a window, it is more difficult to reach the window for opening and closing, the possibility of a shower-tub combination is eliminated, it is likely to be colder near the window, the position is too public, and the problem of curtaining the window is complicated. Some of these objections may be removed if this wall of the bathroom is composed of glass blocks instead of being lighted by a single ordinary window. An

example of this is shown in Fig. 61. The glass blocks admit light but preserve privacy, and it is possible to use a shower in connection with the tub. Desirable bathroom clearances are listed below:

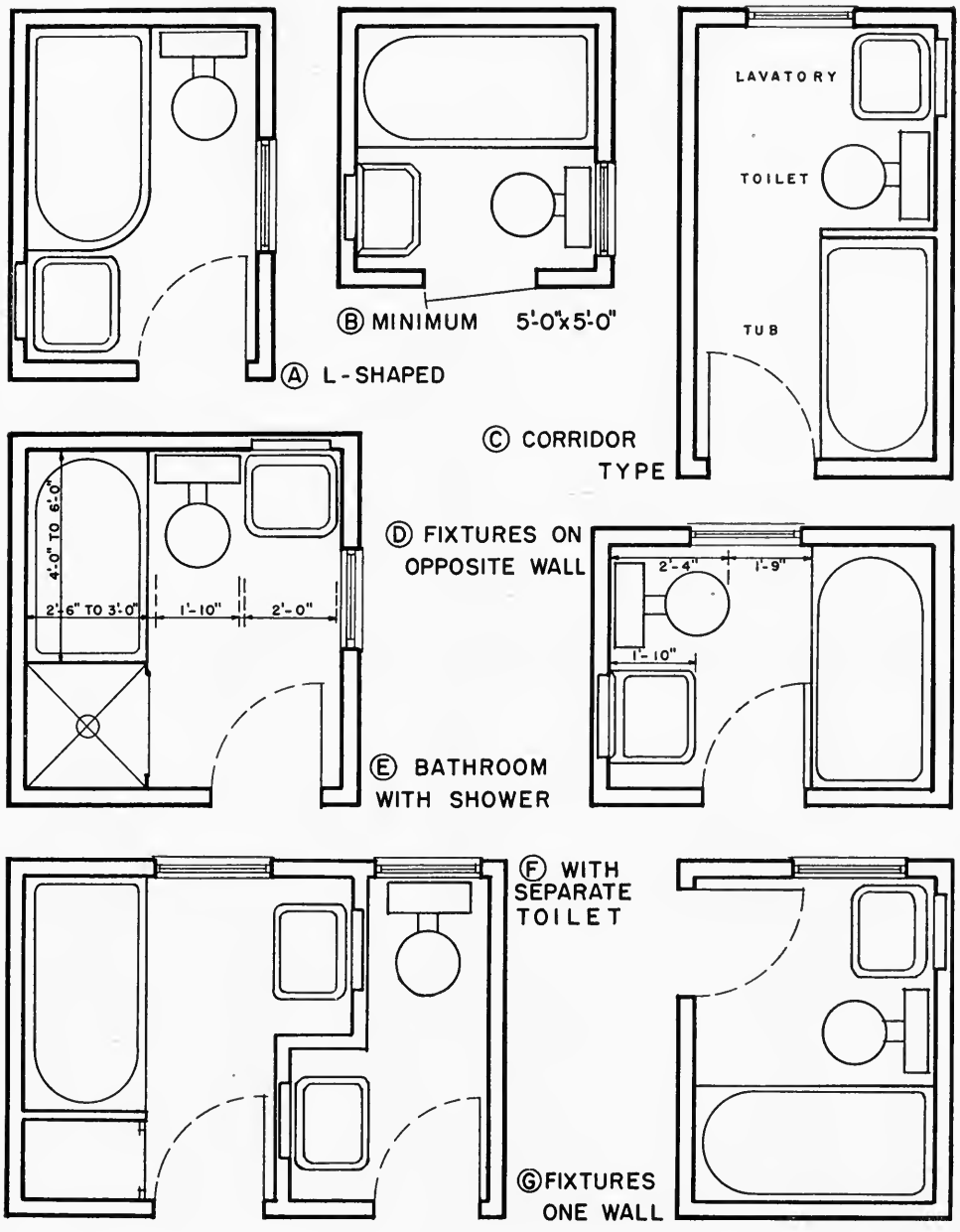
BATHROOM DIMENSIONS

Between	
front of toilet and wall	2 ft.
front of toilet and other fixture	1 ft. 6 in.
side of toilet bowl and wall	8 in.
front of lavatory and wall	2 ft.
front of lavatory and low fixture	1 ft. 6 in.
edge of tub and other fixture	2 ft.
edge of tub and wall	2 ft. 6 in.

NUMBER. It has been found that a minimum of one bathroom and one lavatory or washroom is desirable for the average medium-priced home with two or three bedrooms. If the house is all on one floor, the one bathroom may be located so that it will also serve as a lavatory, as on page 108. In a two-story house, the second-floor bathroom is not convenient from the first floor. A first-floor lavatory saves all members of the family and the guests many unnecessary steps and is well worth the extra expense. If the house has four bedrooms, at least two bathrooms are needed.

LOCATION. There is some economy of cost effected if the two second-floor bathrooms are placed back to back or above any other first-floor plumbing. Any arrangement of this kind eliminates some piping and saves a few dollars, but the saving is too small to allow it to interfere with good planning. The bathroom should be located correctly in relation to the rest of the plan, and, if a little extra piping is required, the general workability of the entire house may be well worth it. Also the architect or plumber may find an economical arrangement of fixtures within the unit which will tend to offset any extra cost.

If there are two bathrooms on the second floor, one of them should be a "public" bath. It should open directly into the hall, for guests and members of the family who may not care to enter any of the bedrooms at that time. One bath may be entirely private, designed so that it is an integral part of a bedroom, dressing room, and bath combination. Bathrooms should be located so that closets are placed between them and adjoining bedrooms in order to insulate the bedrooms against noise. As a further precaution, the soil and supply pipes in the walls may be wrapped with insulating material to help deaden the sound of running water. Bathroom doors should not be on the axis of a hall or placed so that the interior of the room is conspicuous. Bathroom doors should also be removed a reasonable distance from the entrances to bedrooms, so that early morning traffic will not disturb late sleepers.



BASIC BATH ROOM LAY-OUTS

Fig. 57. Suggestions for arrangement of fixtures in bathrooms of varying sizes and shapes. Attention should be given to dimensions of fixtures and to the clear space in front of them.

In spite of standardization, bathrooms may be highly personalized units, varying in materials, colors, and accessories, as seen on page 211. If space and money permit, the whims of individuals may be catered to by the inclusion of dressing tables, mirrors, special illumination, and the conveniences of various kinds of storage spaces. One storage item which is more a necessity than a convenience is an auxiliary closet opening into the bathroom for the major supply of medicines and toilet supplies, as shown in Fig. 57*F*. The usual medicine cabinet over the lavatory is too small for anything except shaving materials and current medicines. This closet might also be equipped with shelves and drawers for the bathroom linen. If a feature of this kind can be incorporated, many daily petty annoyances may be eliminated.

Lavatories

Too often the first-floor lavatory is placed in some closet-like area which is left over after the entrance part of the house is planned. Instead of this it should be designed as an integral part of the hall and should be correctly related to the other features of this portion of the home. It should always have outside light and ventilation, at least until the development of the completely mechanized house. As a minimum, it should contain a wash basin and a toilet, compactly arranged but not crowded. It should be close to the front entrance but should not open directly into the hall so that it will be conspicuous. An excellent arrangement is shown on page 130. Too often the first-floor lavatory is visible from the living room, and the fixtures may be seen if the door is left open. Since the use of the lavatory is often related to entering or leaving the house, it should be close to the coat closet, so that the children may wash when they come home from school or father may tidy up without going upstairs.

The lavatory may be small in size and simple in treatment or it may be ambitious. It may take on the nature of a powder room with gay walls and curtains, and may be equipped with a dressing table and other feminine accessories. It may be an area related to the coat closet itself, as in Fig. 62*A*; but no matter what or where it is, it should be inconspicuous from both inside and outside the house. This calls for proper consideration of window treatment, both as to size and location. Here is another place where glass blocks may be of help in furnishing light while preserving privacy.

The Laundry

The laundry is coming into its own along with the kitchen, but, unlike the latter—about which there are definite ideas as to location and equip-

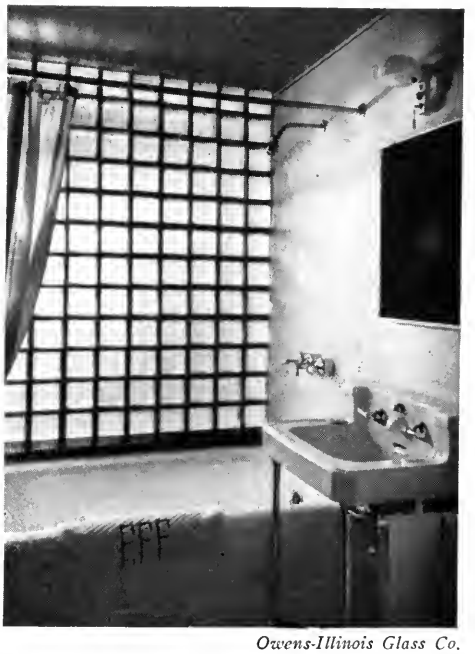
Standard Sanitary Co.

Pittsburgh Plate Glass Co.

Standard Sanitary Co.

FIG. 58 (*above*). Conventional arrangement with fixtures on one wall.

FIG. 60 (*below*). With shower compartment.



Owens-Illinois Glass Co.

FIG. 59 (*above*). Bathroom with glass-tile walls and linoleum floor.

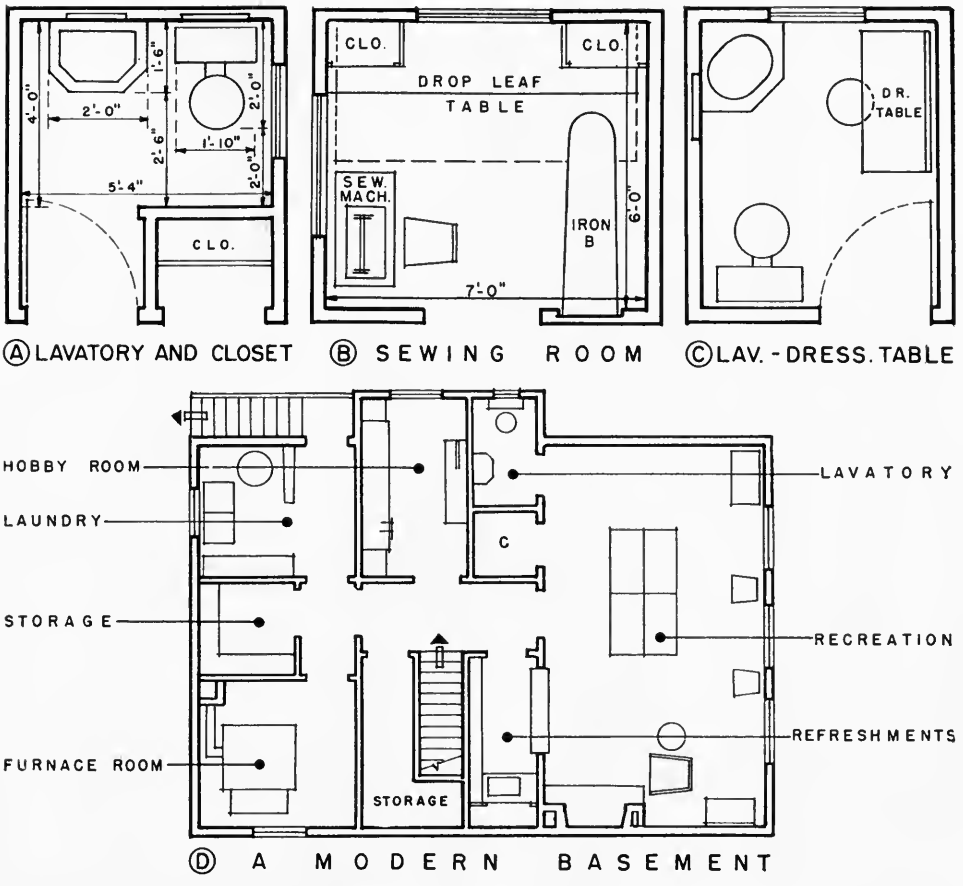
FIG. 61 (*below*). Use of glass-block wall.

ment—it is still something of a stepchild. For decades the laundry was a dark, dank corner of the basement wherever space could be found for some laundry tubs. Later a definite room was assigned to it, and the equipment was improved in quality and kind. And now efforts are being made to take the laundry upstairs and make it part of the kitchen, or, at least, place it adjacent to this unit. Designers are appealing to housewives for both physiological and psychological reasons to move the laundry to the first floor, because it is thus more convenient and cheerful. But before the laundry is assigned to any definite area, it is desirable to analyze the situation in light of the influences of site, cost of house, and family habits, as follows:

1. Will the laundering be done at home? If so, by the housewife? or laundress?
2. Will there be a full basement, and, if so, is it on a sloping lot so that good light is available?
3. Will the clothes be dried indoors on racks? or in a dryer? or will they be hung outdoors most of the time?
4. Will the plan permit a first-floor laundry easily or is it difficult to include it without additional cost?
5. Does the housewife want this weekly activity close to the kitchen?

Location. If there is to be no basement to the house or if the basement is to be just large enough to contain the heating plant and a small storage room, then it is possible that the first-floor laundry is necessary and desirable. It may provide a more pleasant work area and a more convenient connection with a kitchen. The housewife can keep an eye on food which is cooking and also answer the telephone more easily while she is doing the weekly wash. However, there may be a tendency to conserve on space to such an extent that the laundry area is crowded, especially when one realizes that it may be used only one or two days a week. Usually this amount of time will take care of both washing and ironing for the small family. On the other hand, if the laundry is connected with the kitchen, it may be used every day for some small chore related to cleaning and sanitation, as shown in Fig. 38*C*. It may thus become a secondary work space, similar to that needed in the rural home (see page 141), and thus justify its important position. The first-floor laundry is also convenient to the service or drying yard for use in good weather; but, if wash day is rainy, it is not easy to dry clothes in the limited space unless a mechanical dryer is provided.

If there is to be a full basement to the house, it is perhaps less expensive and almost as desirable to have the laundry located there. If an outside



Ⓐ LAVATORY AND CLOSET Ⓑ SEWING ROOM Ⓒ LAV.-DRESS. TABLE

Ⓓ A MODERN BASEMENT

Ⓔ LAUNDRY-SHOWING ROUTINES Ⓕ LAUNDRY-FREE-STANDING TUBS

TYPICAL MISCELLANEOUS ACTIVITY AREAS

FIG. 62. Lavatories, sewing rooms, and laundries require the same careful planning as does the rest of the house. Plan *D* is the basement of the house shown in Fig. 14.

areaway or a grade-level entrance can be included, the drying yard may be just as accessible as from the first floor. In rainy weather there is more space available in the basement for hanging clothes. With the necessity for compactness eliminated, the basement laundry room may be larger than one located elsewhere, and a cheerful atmosphere may be secured by the judicious use of light-colored paint. The room is then "out of sight, out of mind" for five or six days of the week.

Equipment. Designers of laundry rooms should realize that there is an orderly procedure to the washing of clothes just as there is to the preparation of a meal. The soiled clothes are first sorted, those requiring boiling being put in the boiler while the remainder are placed directly in the washing machine. After being washed, they are rinsed, dried, starched, and ironed. The equipment necessary for these different steps may be arranged so that there is a definite sequence just as there is in the kitchen. This is illustrated on page 213. There should be a table for the sorting of clothes, with the laundry tubs and washing machine located conveniently close. The tubs should be placed so that the worker can reach both ends easily and can operate the washing machine and its wringer with the minimum amount of effort. A hot plate for the boiling of clothes or making of starch should naturally be close to the tubs. If a mechanical dryer is included in the equipment, it should be next in sequence. There should be an additional table next to the ironing board or mangle to receive the clothes after they have been ironed. If the laundry is to be on the first floor as part of, or adjacent to, the kitchen, it must have the essentials of the foregoing equipment, only more compactly arranged. The first-floor laundry is sometimes adjacent to a utility room which contains an oil or gas-fired heating plant, as seen on page 76.

Chapter 23

AREAS RELATED TO STORAGE

One of the first questions which a prospective home owner asks is whether the house has plenty of closet space. The man wants a place to hang his hat and topcoat in the evening and his extra suits on week days, while the woman demands ample facilities for keeping her dresses and housekeeping linen in proper order. In the past, people have been easily satisfied with storage accommodations but they are coming to realize that much of the pleasure to be derived from owning a new home is in the acquisition of places to keep things. As the designer of houses gives thought to the matter, it is found that the storage needs of a family may be reduced to the following basic classifications:

For clothing:
  Current—entrance closet, bedroom closets.
  Seasonal—extra hall closet.
For maintenance:
  Inside—closet for sweeping, dusting, and polishing supplies.
  Outside—store room for garden equipment.
  General—workroom for supplies related to odd jobs.
For household supplies:
  Closets for bed and bath linen.
  Space for dining-room linen.
For seasonal equipment:
  Storage areas for trunks, bicycles, sleds, porch furniture, screens.
For food surplus:
  Storage room for canned goods, fruit, vegetables.
For miscellaneous things:
  Games, books, old papers and records, etc.

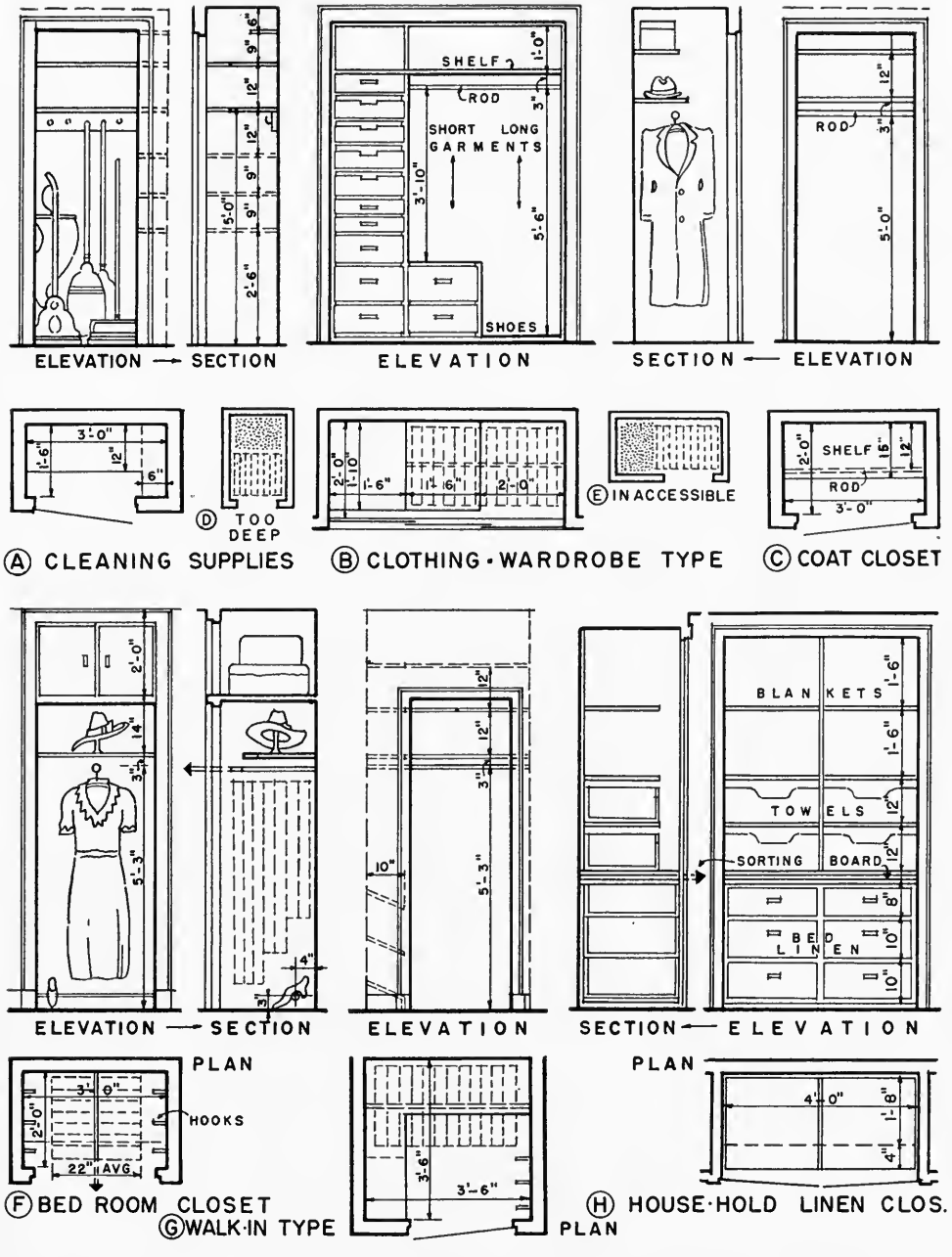
For Clothing

This is probably the most personal item of man, woman, and child which requires storage. As soon as a person enters the house, he or she is con-

fronted with the necessity of disposing of a hat or coat. In spite of this, the coat closet, especially in the small house, has been one of the most neglected of conveniences. This is too frequently true of the one-story house which has no entrance hall and in which the coat closet, if any, is hidden in a rear hall. Too often hats and coats find a resting place in a living-room chair. Except in minimum houses, a coat closet should be provided in or near the main entrance. If possible, it should not open off the area which is used most for circulation; instead it should be inconspicuously but conveniently located a few steps away, as shown on page 112. As previously suggested, on page 210, it may be combined with or related to the lavatory. Desirable dimensions for the plans of hall closets are 2 feet by 3 feet or 2 feet 3 inches by 4 feet, depending upon the number of people to be accommodated, as shown in Fig. 63*C*. If a single closet is wider than 4 feet, the space on either side of the door is too far removed from the opening to be readily usable, as shown in Fig. 63*E*. Some houses may be provided with two coat closets side by side, one for every-day needs, the other for rainy-day things, or for guests, as illustrated on page 126. Another possible division of use is the assignment of one closet to adults and the other to children. If small children are to have access to a closet, their shelves and hooks should be placed low enough to be reached easily.

If the plan of the house will permit, an auxiliary closet for children should be placed near the side entrance or the kitchen door. In the ordinary house, there never seems to be any place for the youngsters to put rubbers, wet coats, or damp snow suits. Many of the cares of the mother can be banished if some closet other than the one in the front hall is provided.

The bedroom closets may vary from the simple cubicle with a clothes rod to the elaborate built-in units equipped with shelves, drawers, and racks. Even on a limited budget, satisfactory closets with suitable equipment can be secured. The needs of the family should be enumerated, and the most efficient and modern—even though simple—provisions for the storage of hats, dresses, suits, coats, and shoes should be installed. Care should be taken to insure that closet space is used effectively—that it is designed to fit the articles to be stored. If possible, separate closets should be assigned to the husband and wife. This is an actual as well as a psychological need. Individuals respond to a feeling of privacy and a sense of ownership, unshared by anyone else. Men's garments vary in size and nature from those of women, and each person has his or her own ideas about the hanging of clothing. Most women object to men pushing their dresses



VARIOUS TYPES OF STORAGE ARRANGEMENTS

FIG. 63. Storage requirements vary greatly with families of different sizes and interests. These drawings suggest only a few of the many types of necessary closets.

around in the search for a pair of trousers, while men do not like to rummage through feminine garments in order to find a topcoat.

Whether the bedroom closets are inexpensive or costly in their equipment, thought should be given to the storage of the various items of a wardrobe. What are the sizes of the following items, and what are their space requirements based on the quantity to be stored?

Men's Clothing

Suit coats, with trousers hanging folded or straight.
Sweaters, jackets, and other short objects.
Topcoats, dressing robes, and other long objects, which require more space.
Shirts, pajamas, handkerchiefs, and underwear in shallow drawers.
Hats on hooks or in boxes on shelves.
Shoes on racks or shelves.
Neckties on racks.

Women's Clothing and Accessories

Blouses, suits, skirts, and other short objects.
Dresses, slips, dressing gowns, coats, and other long objects.
Hats with boxes or holders.
Shoes on racks or shelves which are easily accessible.
Bags and small accessories in drawers or on shelves.

Children's Clothing

Coats, suits, dresses, shoes.

The sizes of some of the more important items of clothing are indicated below:

STORAGE OF CLOTHING

Ample Space per Garment on Rod	
Suits	3 in.
Trousers	2 in.
Overcoats	4 in.
Dresses	2 in.
Skirts	2 in.
Coats, heavy	5 in.
Distance between floor and rod	
Adults' topcoats and suits	5 ft. to 5 ft. 3 in.
Short coats, shirts, skirts	4 ft.
Evening gowns	6 ft.
Children's garments	3 ft. to 4 ft.
Width of garments on hangers	
Suits and coats	1 ft. 8 in. to 1 ft. 10 in.
Dresses and blouses	1 ft. 6 in. to 1 ft. 8 in.

Articles to be stored on shelves vary in size so that it is difficult to assign

exact spaces to them. Women's hats are extremely variable in size and appearance, currently averaging perhaps 8 inches to 15 inches in diameter and 4 inches to 8 inches in height. Men's hats are likely to be 10 inches to 12 inches in diameter and 5 inches in height. Shelves for hats and hat boxes should be 15 inches deep and spaced 12 inches apart vertically. Shoes vary in length from about 8 inches to 13 inches and a pair of shoes occupies 6 inches to 9 inches on a shelf. Shoe racks or shelves should be about 8 inches apart vertically.

For both men's and women's things, provisions should be made for the separation of the heavy and coarse articles, such as outdoor coats, from the more delicate ones, such as silk dresses. The interior of a bedroom closet is a highly individual space and should be designed around the specific requirements of the owner. Only the limitations of cost will act as a restraining influence upon the various possibilities which the imagination will envisage in connection with storage areas. Many novel and practical solutions are possible if one simply keeps in mind that all parts of the storage area should be easily reached, that the clothing should be protected from dust and dirt, and that the assigned space is adequate for the quantities and sizes of things to be stored. The wishes of individuals naturally change any standardized arrangements. Some persons may prefer a closet equipped only with a rod for the hanging of large objects, with the understanding that all the smaller things are to be laid flat in the drawers of dressers, chests, or equipment built into the bedroom itself, as in Fig. 52*F*. Others may wish a series of closets along the side of the wall, each fitted with the particular type of tray, shelf, or hangers for the storage of specific items, as shown in Fig. 63*B*.

No matter what the storage requirements may be, the closets should fit into the general architectural scheme. They should be located correctly with reference to the bedrooms and be given the proper dimensions. Too often they are forgotten until the last minute, when a corner must be taken out of a bedroom in order to insure their inclusion. This practice leads to irregular and awkward room shapes and results in bad planning. Usually closets should occupy a space about two and one-half feet deep between two rooms, and they should run the full width of a room in order to provide sufficient closets for each room. This makes for regularity in planning, and also provides an insulating unit between the two bedrooms.

The storage of seasonal clothing is a matter which must not be overlooked in the design of a home. In addition to the several bedroom closets, there should be included one or more hall closets for the general storage of family clothing during the off season. This may be equipped according

to the needs of the family, with drawers, shelves, and plenty of hanging space for clothing in paper or mothproof bags. It may also be lined with cedar, which is popularly supposed to discourage destructive insects and their offspring. In this closet may be kept the summer clothes during the winter and the winter things during the summer. It may also serve as a place for those extra coats and suits which no one wants in his or her closet.

For Maintenance Equipment

Next to kitchen work in importance is the task of keeping the house clean. This is a major task in any home and doubly so in a large, smoky city, or where there are active children. Housework is fatiguing enough under the best conditions, and everything should be done to make it as easy as possible. One of the pet peeves of housewives is that they do not have proper storage facilities for the things with which they work. The designer of successful homes must see to it that this fault is corrected. In some convenient but inconspicuous place on the first floor, an adequate closet must be provided for such items as a vacuum cleaner, a carpet sweeper, a broom, cleaning brushes of all kinds, dust pans and dust mops, wax, cleaning compounds, furniture polish, sponges, and chamois. This calls for a closet with five or six square feet of floor space, equipped with shelves, racks, and hooks as shown in Fig. 63*A*. This closet may be near the kitchen or pantry, or, better still, may open from a side hall or passage, as illustrated on page 112. It is also desirable to have a small closet on the second floor for the most essential cleaning articles, so that minor chores may be done without going to the first floor for tools.

There is also the matter of exterior maintenance which must not be overlooked when planning storage space, because the grounds surrounding the house must be kept in order also. There should be some kind of store room for a wheelbarrow, lawnmower, hose, ladders, and garden tools. The location of this will depend upon the general plan, but it should be kept in mind during the development of the entire layout. This room might be placed under a high porch or terrace or a flight of steps leading to it, especially as an outgrowth of a sloping lot. It may also be included as an alcove of the garage, as shown on page 76. The storage of these essential tools should not be left to chance, or they may find themselves stacked along the inside walls of an already crowded garage, adding to its untidiness and disorder.

For general maintenance about the house, a basement workroom or a small area opening from the garage will take care of the supplies needed. If a man has a work bench and a place for paint, nails, and tools, as in

Fig. 17*C*, he will be encouraged to do a number of odd jobs around the house which become quite expensive if a skilled mechanic has to be called each time some minor repairs are needed.

One of the faults of houses without basements is that it is difficult to provide adequate space for the storage of bulky objects, such as garden tools, bicycles, trunks, and screens. Basements are eliminated primarily to reduce costs, and there is a temptation to omit storage rooms on the first floor in order to save money. This is false economy, for a home without plenty of general storage area does not function efficiently. This feature is essential to comfortable living.

For Household Supplies

Provisions must also be made for those items which come under the general heading, household supplies, and may be listed as sheets, pillow cases, blankets, comforts, bed spreads, quilts, pillows, and mattress covers. The minimum accommodations consist of a closet about 2 feet by 3 feet in area, equipped with shelves and drawers. More adequate facilities provide greater space in a single or in several closets fitted with shallow drawers or trays of a better type which may be removed for handling and with shelves, made to slide for ease of operation, as shown in Fig. 63*H*. A shelf which may be pulled out to form a sorting table is a desirable feature. Storage closets for this purpose are generally located in the bedroom floor hallway, so that they are easily accessible from the sleeping quarters.

In addition to the above there should be a closet equipped with drawers and shelves for the storage of bathroom linen. This may be in the bathroom itself, if there is only one such room, or in the hall in case there are two or more baths.

It is possible that there will be a need for closet storage space for table linen used in the dining room. This will be the case if there are no built-in storage areas or if the room is not furnished with the usual orthodox pieces of furniture.

For Seasonal Equipment

The more traditional type of house with a basement and an accessible attic space provides adequate storage space for those objects which are wanted only at infrequent intervals. However, the designer of the less traditional dwelling should not overlook the necessity of arranging for some kind of room to receive such things as trunks, bags, bicycles, porch furniture, baby buggy, screens, and boxes of indefinable whatnots. Unless a

definite place is assigned to them, they will clutter up other parts of the house in an unpleasant manner.

For Food Surplus

This item is not so important as it was some years ago, for an entirely different attitude now prevails toward food supplies from the one that existed at the turn of the century. Housewives in urban communities no longer can fruit and make jelly in the same quantities they once did, and the storage of large supplies of bulky produce is not necessary in this day of rapid transportation. Housewives are usually as close to the source of food supply as they are to their telephones. However, there are still those of us who like to drive into the country on a sunny October day and buy a bushel of apples or a basket of walnuts from a roadside market. Or perhaps home-canned peaches taste better than factory-canned ones. At any rate, some provision may be made for a small, cool storeroom in the basement for just such things. If it is not used for the storage of food, it will soon be filled with extra dishes, a chair to be repaired, or temporarily unwanted toys.

For Miscellaneous Storage

When the designer of a house is developing any room—whether it is the kitchen, dining or living area, or hall—he should be constantly on the lookout for a chance to include a small closet, an area, or a set of drawers to hold all those miscellaneous things which seem to be left over when all the other provisions have been made. For instance, where are we going to keep card tables and chairs, children's games, golf clubs, tennis rackets, things related to hobbies, old magazines, children's favorite possessions which cannot be banished to the playroom or bedroom, and all the innumerable other things which seem to accumulate? This question can be answered by the ingenuity of the designer, and is limited only by the size, cost, and arrangement of the house itself. There are a number of places where closets of this type can be worked into the floor plan, and such opportunities should always be developed to the fullest extent.

Chapter 24

AREAS RELATED TO SERVICE

Servants' Quarters and Transportation

Servants' Quarters. The location and design of a maid's room do not enter into any of the considerations in connection with the minimum and inexpensive houses. It is only in the planning of the medium-priced and expensive homes that this problem must be studied. With the growing tendency in the direction of the development of labor-saving devices and the employment of part-time help, the maid's room is often omitted from even the medium-priced dwelling. However, if the financial status and wishes of the family call for a servant's room, definite and adequate space must be provided. It should not be tucked away in the attic or over the garage unless these areas can be reached easily and contain the proper facilities for comfortable living. Servants, being human, will respond to cheerful quarters which are cool in summer and warm in winter. Usually the maid's room should be located near the kitchen and separated from the remainder of the house in a satisfactory manner. Its windows should not look out upon any of the living areas of the family, such as a terrace, porch, or lawn. In general design, it should be treated as a regular bedroom, with ample storage space and a small private bath. A maid's room is incorporated in the plan shown on page 78.

Transportation. The size of the garage is naturally determined by the family income and the way in which it is to be spent. The American attitude toward automobiles seems to be in favor of owning as many cars as can be afforded or purchased, and this varies from none to one or more. For the average small home, provisions should be made for one car, while a two-car garage is often essential to the medium-priced house. The dimensions which are considered desirable for convenience are about 10 feet to 12 feet wide for one car and about 17 feet to 19 feet wide for two cars. The depth of a garage may vary between 18 feet and 20 feet

or more, depending upon the requirements. The garage may be detached or attached to the house, or even located in the basement. Attached garages are more popular than detached ones because of the added comfort. They may be easily heated from the house heating plant and they may be reached without the necessity of going out into the weather. If the size of the lot permits, they may be faced toward the side or rear. However, the garage which faces the street can be incorporated with the general massing of the house in a satisfactory manner and becomes an interesting feature, especially if the garage doors are kept closed.

In those parts of the country where mild temperatures prevail, an open but covered car shelter may take the place of the enclosed garage. The area for such a shelter should be screened in some way so that it is not conspicuous. This is an inexpensive substitute for a garage, but it does not provide any storage space for all those things which seem to find their way into the average motor room. The individual owner must decide about such matters related to transportation.

Chapter 25

THE ARCHITECTURAL SETTING FOR WORK ACTIVITIES

In order that we may not become so engrossed with the architectural problems of house planning that we neglect some of the human factors, let us call attention to the work necessary in the maintenance of the various activities and areas discussed in the preceding chapters. Living in a house necessitates work, both mental and physical. Sometimes housewives feel that there is too much of the physical required in connection with homemaking, a situation often caused by improper planning of the house with reference to the work activities. If work centers are correctly arranged and related to other areas, manual labor may be reduced to a minimum.

The various types of work in a home may be classified as follows:

1. Work of housewife or servant
   - Kitchen work
     - preparation, cooking, serving of food
     - dishwashing
     - kitchen maintenance
   - Maintenance
     - sweeping, dusting, polishing, washing
     - care of beds
     - sewing
     - laundering of clothing, household linen
2. Work of husband
   - Occupation
     - sometimes carried on in home
   - Homework
     - work brought home from office
   - Maintenance
     - minor repairs
     - yardwork
3. Work of children
   - help with housework

homework
  study of lessons
self-expression
  work growing out of outside activities, clubs, and organizations

The Work of the Homemaker

Why do homemakers perform all the physical tasks associated with daily activities? For the same reason that men engage in the occupations of farming, commerce, or industry—largely by necessity. To this we must add the influence of custom, which calls for cooperation of individuals and the division of labor among the various members of the family. But housework is likely to be drudgery unless it is motivated by other forces. The work in a home is usually acceptable because of the mother's love for the family and the pride which comes from work well done. Also since individuals tend to conform to the current social pattern, the housewife seeks and wins the approval of her particular social and economic group by the quality of her homemaking activities. All this exists in spite of the fact that housework of recent years is often less interesting than at times in the past. There has been a decrease in craftsmanship in the home just as there has been in the building industry. The construction of houses has been simplified by the use of the machine, and the old-time skilled artisans are disappearing. In homework, also, there is less creative endeavor. Pioneer women took pride in their cooking, baking, weaving, and knitting. Now commercial agencies have removed some of the physical aspects of housework and much of the interest. The handcrafts have largely disappeared. The vacuum cleaner is efficient and labor-saving but, for most women, devoid of romance. Perhaps this attitude could be counteracted by an attempt to visualize the romance of the machine—the machine which enables housewives to plan and work efficiently and to take pride in the skillful performance of every-day tasks. For those whose imaginations refuse to give to mechanized housework much of the quality of creative endeavor, the knitting and crocheting which women now engage in between tasks provide an escape from the impersonal mechanization of the modern house.

It is the duty of architects and house designers to plan homes which reduce the physical discomforts associated with housework and increase the pleasure in preparing for family activities. Pride is a natural trait and may be fostered in the setting of an efficient and beautiful home.

Management. A well-planned house provides the background for housekeeping activities but does not insure smooth operation. To good architectural planning must be added efficient work practices developed

according to time and motion studies. These are often not available to the average housewife, but if their principles are applied in some simplified manner, the usual worry and fatigue will be lessened. Time and motion studies show the steps and motions which are necessary with various arrangements of equipment within a room and with different relationships between the rooms themselves. They also show the energy expended in performing tasks in various ways. In designing kitchens, dining areas, living rooms, laundries, and storage closets, an analysis should be made of the steps necessary to perform the following typical tasks:

Dishwashing—Removing dishes, scraping, washing, rinsing, drying.
Cake baking—Assembling utensils and supplies, measuring, combining, baking, washing of utensils.
Cooking vegetables—Securing from storage, cleaning, cooking, washing of utensils.
Serving a meal—Dishes necessary, location, serving at range or refrigerator, steps to dining room.
Cleaning living room—Location of cleaning equipment, location of electric outlets, moving of furniture, types of surfaces and materials.
Laundering—Sorting, washing, wringing, drying, ironing.

In the past, architects have sometimes been accused of not having the right attitude toward the design of homes, and women have often said that no man can design a kitchen. Whenever this is true it is because there is no collaboration between the designer and the housewife or because there is little thought given to the work activities in the home. To secure the best results, house designers must realize that well-managed housework is conducted according to a definite plan and that the correct architectural setting must be provided for this activity. Architects, students of architecture, and home planners should have an accurate picture of the management factors connected with the efficient operation of a home.

The work of the housewife in the home may be divided into two categories: (1) the planning and (2) the actual doing of the work, or the mental and the manual. There is no distinct line between the two when performed by the homemaker, and the various activities tend to merge. When there is domestic service, there is more division of labor, with the planning being performed by the wife and the physical work by the servant. If thought is given to the planning and if the architectural background is satisfactory, the actual performance is much easier than otherwise. The more important types of housework for urban families may be classified as follows:

Activities	Architectural Conveniences
Mental activities	
Planning of meals, housework, and budgets.	Planning desk in kitchen, study, or living room for menus, recipes, accounts, and records.
Organization of work for members of family, dependents, or servants.	Efficient house plan and correct materials and equipment to insure sufficient time to plan and organize.
Manual activities	
Shopping.	Proximity to shopping center and department stores. Convenient service entrance. Quiet area for telephoning.
Food preparation and dishwashing.	Kitchen compact, yet large enough for necessary workers. Correct sequence of work areas. Proper equipment.
Maintenance of house.	Materials and surfaces which are easily maintained. Ample closets for household supplies and cleaning equipment.
Maintenance of clothing.	Adequate laundry and sewing room.
Care of children and the sick.	Nursery and play areas located for easy supervision from work areas. Well-arranged bathrooms. Quiet, cheerful, and well-equipped bedrooms.

The scientific management of housework in an efficient architectural setting depends somewhat upon the scheduling of daily and weekly tasks. The house should be arranged so that the housewife can make effective use of her time, and the arrangement should serve as an aid in eliminating much of her physical fatigue and nervous strain. The work plan of the homemaker should in turn fit in with the architectural plan of the home designer. It may do this by providing for a well-organized scheme which allocates the correct amount of time for each task with frequent changes in the type of work to minimize fatigue and with sensible standards of performance assigned to various activities.

These considerations are strictly non-architectural and are the result of the housewife's planning. These are management factors which are necessary, however, in order that the efficiently designed house may be fully effective. A well-planned house contributes little to the proper interpretation of family life if the work carried on in it is improperly managed. On the other hand, scientific work planning is somewhat nullified in an awkwardly arranged and poorly equipped house.

Fatigue and overwork should be reduced to the minimum by the housewife and the architect, if an harmonious existence is to be achieved. The amount and degree of physical work depend upon several factors, which, in some instances, may be beyond the control of individual family groups, as

1. Amount of income.
2. Size of family.
3. Standard of living.
4. Plan of house.
5. Type of equipment.

If the income is small, the family large, conveniences few, and the house poorly planned, manual labor may reach the maximum. If the income is adequate, mechanical equipment is modern, labor-saving devices are ample, and the rooms are efficiently arranged, housework may be reduced to the minimum.

While the convenience and comfort of the entire family are important, they should not be maintained by too much sacrifice of the wife's time and energy. Proper social life cannot be fostered if the homemaker has little time for participation or is too tired from her housekeeping duties. The following typical work activities are listed in the possible order of their fatigue-producing effects in many homes:

1. Washing and ironing.
2. Daily and weekly cleaning of house.
3. Preparation of meals.
4. Care of children.
5. Sewing and mending.

This sequence will vary with the size of the family, the ages of the children—if any—the efficiency of the house plan, and the types and number of labor-saving devices. If children are small and equipment inadequate, the physical care of children may easily be more fatiguing than most of the other household tasks.

The fatigue produced by housework may be reduced to a minimum by:

1. *An Efficient House Plan*
   - Kitchen—convenient in location and size, large enough for informal dining and child play, small enough to reduce unnecessary steps.
   - Dining area—economical of footsteps at meal time.
   - Laundry and storage areas conveniently located.
   - Adequate vertical and horizontal circulation.
   - Satisfactory ventilation and natural light.

2. *Proper Equipment*
   - Necessary kitchen equipment.
   - Adequate convenience outlets.
   - Labor-saving devices for housework.
   - Modern laundry facilities.
   - Efficient heating system, with registers or radiators which are easily cleaned.
   - Up-to-date lighting and plumbing.

3. *Efficient Arrangement of Equipment*

   Kitchen work centers sequentially arranged.
   Convenience outlets correctly related to work spaces.
   Bathroom and laundry fixtures easily reached for use and for cleaning.

4. *Correct Dimensions*

   Rooms adequate in size to permit correct location of furniture.
   Furniture correctly related in size to wall spaces and circulation.
   Work areas with ample space and correct heights of equipment to reduce stretching and stooping.

5. *Adequate Storage Areas*

   Storage for supplies, cleaning accessories, clothing, and household linen adjacent to places used, contributing to a sense of orderliness. Areas designed to fit objects to be stored.

6. *Correct Materials*

   Selection of materials for walls, floors, furniture according to both appearance and function. Ease of maintenance, amount of upkeep, and frequency of replacements are important considerations.

The entire house is the housewife's work area, and it should be designed to contribute to her safety and well-being as well as that of other members of the family. It should be economical of time and energy and should also provide for the overlapping of work activities. The homemaker should be able to carry on more than one operation at a time, such as ironing and cooking, laundering and child supervision, cleaning and baking. The plan arrangement should provide a definite barrier between work and living areas, if there is domestic help, or bring all activities into closer relationship if family life is modest and centered around work interests.

The Work of Other Members of the Family

The husband and the children are often required to help with the housework, and space should be provided for more than one worker in the various work areas. If the proper maintenance of the yard and the house by the father is to be encouraged, there should be adequate storage facilities for supplies and tools. If children are to develop mentally and physically, they should have provisions for home study and for the expression of their hobbies and creative endeavors.

STUDY EXERCISES

1. Select a definite family and analyze their recreational needs and interests.

2. Design a living room for the above family. Locate doors, windows, and furniture on a plan drawn at ¼-inch scale. Study circulation, flexibility, and grouping of furniture.

3. Select a definite living room and relocate the doors and windows to permit better furniture arrangement.

4. Collect illustrations of various living-room arrangements. Classify them according to the scheme of furniture grouping.

5. Make plans of living rooms showing furniture arranged, for minimum change, for
   a. Three tables of bridge
   b. Two groups of conversation
   c. Informal dancing
   d. One group for conversation and one group at game table.

6. Develop, by means of sketch plans and illustrations, pleasing and interesting living-room arrangements with the following centers of interest:
   a. A large sofa or couch
   b. A fireplace
   c. An old secretary
   d. A bay window.

7. Design a basement recreation room 14 feet by 22 feet.

8. List the hobbies of a specific family, or typical hobbies of adults and children, and plan areas for these activities.

9. Plan an L-shaped kitchen with a dining nook or play space. Trace the route of the food, as shown on page 175.

10. Select a definite kitchen and rearrange the doors, windows, and equipment for greater efficiency in operation.

11. Make sketch plans of a rural kitchen 14 feet by 16 feet, showing equipment.

12. Collect plans of houses and group them according to the location and character of the dining space.

13. List the dining space and equipment requirements of your family, based upon their habits and desires.

14. Measure a number of dining rooms and arrive at an average size.

15. Select a definite dining room and make sketch plans showing several different arrangements of furniture.

16. Select a definite dining room and make sketch plans showing how rearrangements of doors and windows will permit better grouping of furniture.

17. Analyze the sleeping needs of a definite family, as suggested on page 198. Make sketch plans of the necessary bedrooms and locate the furniture.

18. Select a specific bedroom and relocate the doors, windows, and furniture for greater convenience.

19. Locate the electric outlets in the living room, dining room, and bedrooms of your house with reference to the furniture.

20. Collect plans and illustrations of bathrooms and group them according to type, efficiency, and interest.

21. Select a definite family and list the storage requirements for:
   a. Clothing for various members.
   b. Cleaning supplies.
   c. Household linen.
   d. Seasonal things.

22. List children's belongings and plan places where they may be readily accessible.

23. Measure a number of garages and arrive at minimum and average sizes for one and two cars.

24. Make a list of the work activities of both an urban and a rural housewife during:

the morning, afternoon, and evening.

25. Suggest architectural conveniences for various work activities.

26. List correct equipment, dimensions, and materials to accompany various activities related to housework.

27. Collect and analyze plans with reference to the time and motions necessary in the performance of the tasks listed on page 227.

PART FIVE

THE DEVELOPMENT OF INTERIORS

Chapter 26

THE TREATMENT OF SURFACES

In developing the general scheme of a house and in working out the details of the individual rooms, certain arrangements of plan areas will result. The average person does not visualize these horizontal relationships easily. It is true that, after he has taken a trip through the house, he realizes that rooms are related to each other in position, but his most vivid impressions are based on three-dimensional architecture. He sees enclosed space—volume bounded by walls, floors, and ceilings. He sees surfaces and objects, each having definite physical characteristics with reference to materials, colors, patterns, and composition. Thus after the house is designed, built, and furnished, it is judged, superficially at least, by the effect which it creates by means of its exterior and interior treatment. Interiors must be practical, but they should also be beautiful, or, at least, pleasing. What if the plan units are correctly related to each other when the resulting rooms are ugly in composition, the walls and floors inharmonious, and the furniture out of character and poorly placed? The house is only half a home, a physical shelter, but one which is drab and inconvenient. Let us, therefore, look at rooms now, not for efficiency alone, but for pleasing combinations of those elements which contribute to the success of interiors. In doing this, we shall reduce interiors to their fundamentals and think of them in terms of their two components, as follows:

1. Immobile component:
   the architectural setting.
2. Removable component:
   the furnishings.

We shall discuss the elements of interiors in this order and, in Chapter 28, analyze the creative principles by which they may be combined to secure satisfactory results.

As a basis for an approach to a brief study of interior decoration, let us

keep in mind that the success of designs for walls, floors, furniture, and accessories depends on the adaptability of the designs to various tangible requirements, as follows:

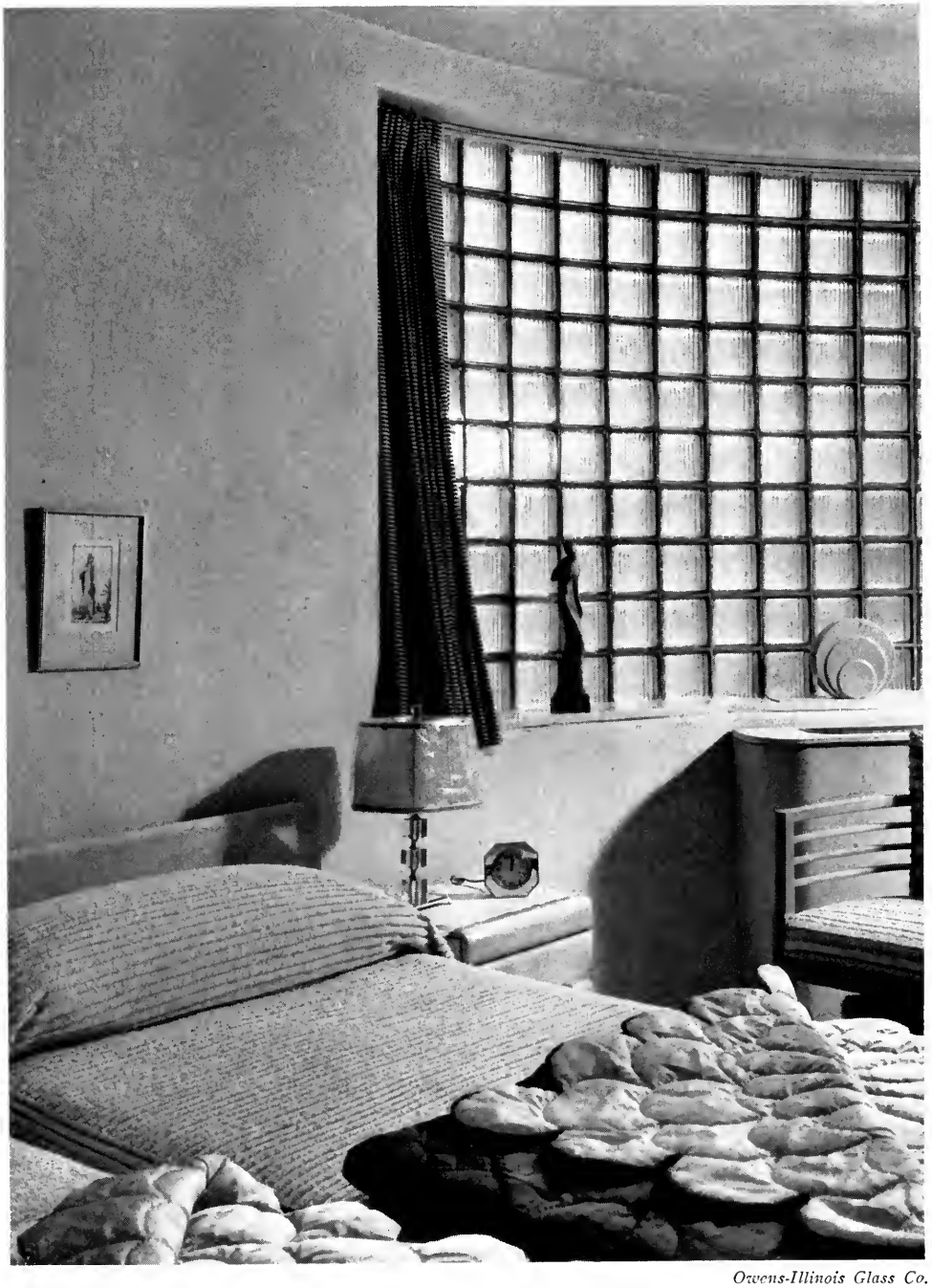
1. Adaptability to purpose:
   Function of room.
   Use of objects.
2. Adaptability to materials:
   Coordination of design, use, and materials.
3. Adaptability to appearance:
   Harmonious relationship of materials, design, and color.
   Proper character.

The importance of the correlation of these factors will be seen as the principles of interior design are developed in succeeding pages.

Walls

Rooms exist because of horizontal and vertical surfaces which afford privacy and protection. We place our furniture upon the floors and push it back against the walls according to our own particular fancies, thus creating ugly, indifferent, or beautiful interiors, depending upon our tastes and interests. Since the walls mark the confines of the room, they are the most conspicuous architectural element and probably deserve first consideration in the study of interior decoration. The walls consist of areas which are dictated by the proportions of the room, and by the location, character, and size of doors and windows. Since these conditions are seldom repeated in exactly the same manner, each room presents a separate study and one which necessitates a careful analysis of its physical characteristics.

Materials. One of the first choices which the designer of houses must make in planning interiors is in connection with materials. Building materials have physical qualities which are related to their durability, strength, texture, and color, and they should be chosen with these considerations in mind. Out of these develops a definite character, which may be simplicity, ornateness, dignity, lightness, modesty, or sophistication. Materials for walls, floors, and ceilings should be selected with a quality in mind which will agree with the architecture of the house. The simple dignity of a Colonial exterior should be repeated upon the interior, while the unbroken surfaces of the contemporary movement should be found on both the inside and the outside of "modernistic" houses. It is difficult to write about or attempt to illustrate the characteristics of building materials. No description or photograph will take the place of actual contact with wood, stone,



Owens-Illinois Glass Co.

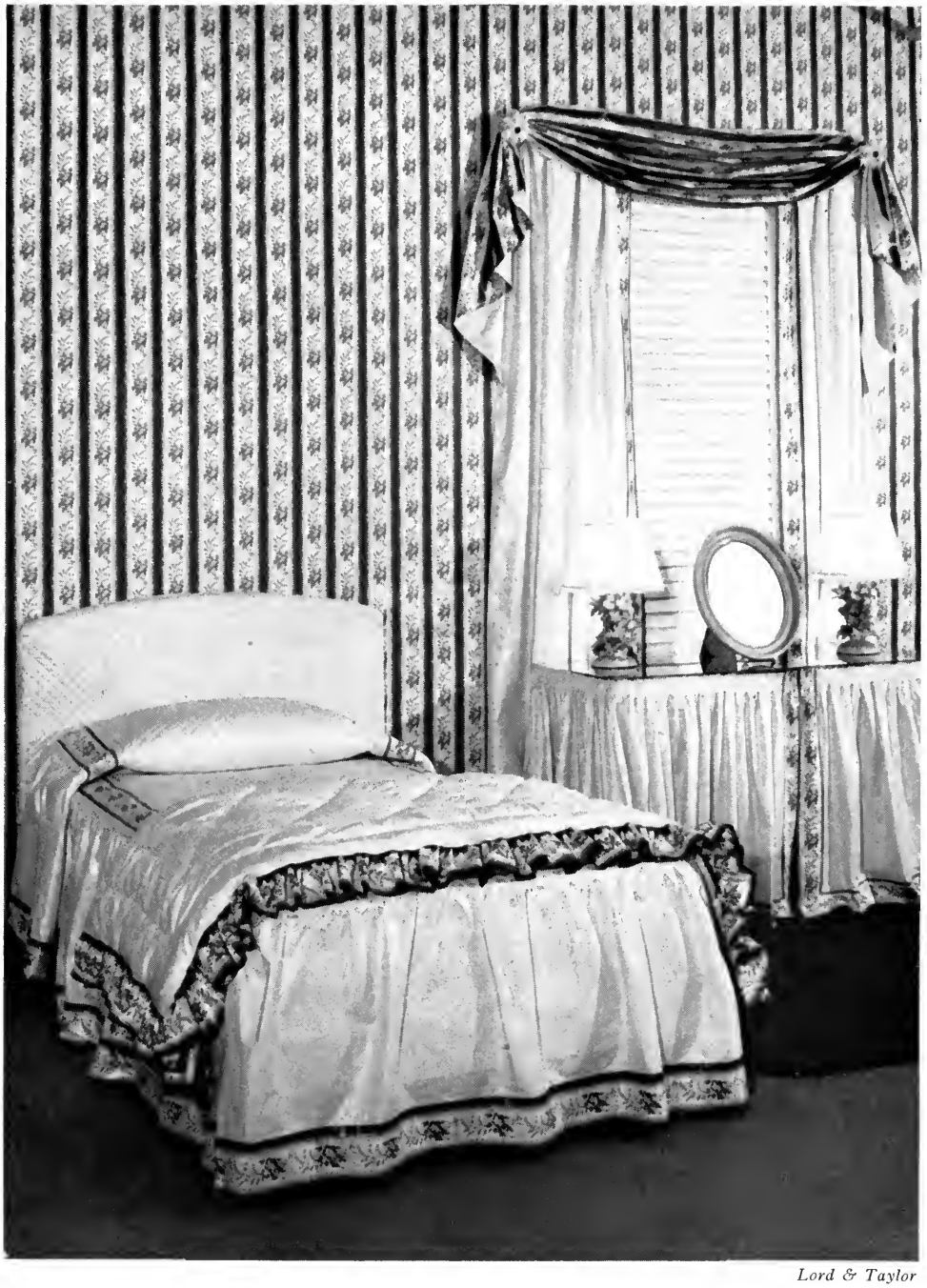
FIG. 64. Painted walls contributing to a streamlined, sophisticated quality. Simplicity of surfaces and interesting contrasts of textures. Sympathetic relationships of furnishings.

or brick. If the prospective home owner or designer of houses is not familiar with the texture and appearance of linoleum, tile, or glass, it is suggested that he examine and study these and other materials either on an actual construction job or in some building-materials exhibit. Only by experience with materials will their physical characteristics and their suitability for certain uses become apparent.

The plastered wall is the most common and one of the most satisfactory of interior finishes (see page 237). This is partly due to its inexpensiveness and to the many ways in which it may be treated. It may have a smooth surface or receive a sand finish or various troweled effects. Smooth plaster may be painted or papered and forms an appropriate background for refined and graceful furniture, whether Colonial or contemporary. The paint may be applied in a flat and even manner with a glossy, semi-glossy, or flat finish, the last being preferable in most cases. If a more interesting effect is desired, the paint may be stippled, or patted lightly with a stippling brush while it is still wet, which imparts a speckled texture to the wall. When the paint is oil paint, various glazes may be employed. Closely related colors are applied in thin coats so that those underneath show through faintly, thus producing a rich and mellow effect. In houses of the Spanish or Early English type, where simple interiors and sturdy furniture prevail, plaster which shows the trowel marks may be desirable. Care should be taken to keep the texture inconspicuous, so that it will not be out of scale with the room and the furnishings.

If the plastered wall is not to be painted, it is an ideal surface to receive wallpaper. Paper is probably the most popular wall finish because of the wide range of effects which may be secured. Wallpaper was first developed to imitate and take the place of wall hangings, such as tapestries and textiles. For that reason it usually has some kind of figure or pattern, as shown on page 239. This pattern may be small in size and subdued in color or large and bright. It may be realistic or conventional, cozy or formal, or friendly or dignified. Its colors and patterns must be chosen carefully with the size and nature of the room in mind. Bedrooms, bathrooms, and breakfast rooms may be gay with flowered papers, dining rooms may use scenic designs if the furnishings are simple, and living rooms should have restful backgrounds for the heavier furniture and numerous accessories of this recreation center. There are no iron-clad rules for selecting wallpaper. The safest way is to try out several different rolls by pinning samples of them to the wall and studying their effect upon the room.

Wood paneling of a simple type is a desirable treatment for parts of a large room or for all of a small room. Its cost is not prohibitive for limited



Lord & Taylor

FIG. 65. Bedroom walls covered with a paper with a pronounced design which is repeated in the trimmings of the fabrics. Individualistic treatment with pleasing contrasts in color.

use in medium-priced homes, and the beautiful effects which may be created are well worth the increased expenditure. The wood may be applied in the form of molded planks or panels of the regular thickness, as on page 241, or it may consist of veneers on fabric applied to a plastered wall or veneers on plywood fastened directly to the structural members of the wall, as shown on page 163. Plywood, composed of several thicknesses of wood held together with waterproof compounds, and wall boards of compressed wood have many uses, finishes, and possibilities. They come in standard-sized sheets that are easily installed and present a finished surface, thus eliminating the necessity of plastering. The joints may be tongued and grooved or covered with strips, the strips adding to the pattern of the wall and the interest of the room. In certain veneered plywoods, the joints do not show and a smooth effect may be secured.

Many of our own domestic woods and some of the more exotic foreign ones may be used for interior finish. Pine may be shellacked and waxed to preserve its natural color. Mahogany, walnut, or redwood may be used in many ways to secure a simple or ornate effect. The wood may be finished naturally or stained to darken and enrich it still further. As a rule, only enough preservative should be applied to the wall to insure the durability of the wood, allowing the inherent beauty of the material to be conspicuous without the undue competition of excessive stain or glossy varnish.

The physical characteristics of other building materials will dictate their choice and use. Glass blocks may be used in the modern house where light but not vision is desired, as in Fig. 27. Sheets of glass in a wide range of colors may take the place of tiles in kitchens and bathrooms, although glass has a high luster and a different quality from that of ceramic tile. Linoleum is admirable for bathrooms, kitchens, breakfast rooms, and playrooms, and may even be used as wall-covering material throughout the house, if the designer is clever enough to harmonize it with the remainder of the interior. Wall linoleum is lighter in weight than that used on floors, and is applied to walls and ceilings like wallpaper with a water-resistant adhesive. It is available in plain and marbleized effects and harmonizes with contemporary interiors. Tile and other synthetic materials may be used in those rooms where the impression of clean, streamlined efficiency is desired. Tile is cemented to metal lath and forms a permanent surface which is easily cleaned.

Color. After a material has been selected for the walls of a room, a color must be assigned to this material. It is here that even greater caution must be exercised than in the choice of materials. The designer should know what the physical properties of colors are and what color will do for

Western Pine Assoc.

FIG. 66. Living room walls paneled in pine. Homelike and intimate in character. Bedroom of this house shown in Fig. 53. Note similarity of treatment. Chas. O. Matcham, Architect.

a room. Although a more complete discussion of color will be found in Chapter 27, it can be indicated here that colors may be divided into two groups according to the impressions which they create. The advancing colors are the yellows, reds, and oranges, which are light and bright in quality. They are strong and conspicuous; they appear to advance and make a room look smaller. The receding colors are cool and appear to retreat. A blue, green, or gray may cause a room to seem larger than it really is, because these more neutral colors tend to blend with adjacent trees and sky and form a background for more colorful objects. As a rule, the cool colors, or at least the less brilliant tones of warm colors, should be reserved for large areas, with the advancing colors being confined to accents.

Usually some kind of compromise must be reached in choosing the colors for room interiors. Unless some striking effect is desired, a neutral color, such as cream, light peach, pale green, or some similar hue, makes a more satisfactory background for furnishings than do the more vivid colors. The same thing applies to wallpaper, which should, in most cases, be inconspicuous rather than conspicuous. Wallpaper may sometimes be colorful and decorative, but these qualities should not be allowed to dominate the average room. Wallpaper should serve as a background to tie together all the elements of the room into a harmonious whole. Bright wallpapers or those with large designs appear to come forward off the wall and may become oppressively important. Scenic wallpapers in dining rooms are quite popular and may have a place there, if the room is used only for dining and if the pictures and furniture are arranged so that they do not add to the restlessness of the room. These remarks about wallpaper apply to both small and large houses, although in the large house the designer has greater freedom in his use of colors. If his fancy runs toward brilliant colors, he may have opportunities to indulge it without disastrous results as long as proper harmony is maintained in hue, intensity, and design.

It is possible to change the apparent proportions of a room by the careful use of color. A square room may be made to appear rectangular if one or two walls are finished in cool colors while the others are painted in warm colors. The area painted in the advancing color will appear to come forward and lessen the length of the room. This illusion will be strengthened if the heavier pieces of furniture are not distributed evenly about the room but are grouped on one side in an informal composition. Variation in appearance, for variety and interest, may also be secured by changing the wall material. Wood paneling or plywood may be used on the end of a room while plaster with paper or paint may cover the other three sides.

This provides a change in color and texture and focuses attention upon what might otherwise be an uninteresting termination of a living room.

In selecting color schemes for individual rooms, it is well to keep in mind the psychological effects of color. Some colors, such as brilliant yellows, oranges, and reds, are stimulating and exciting. A circus or night club depends upon them to help create a carnival spirit. Brilliant colors have their place in home decoration if used sparingly and carefully. Some rooms of the house may be gay or even exotic; others should be quiet and restful. As contrasted with the warm colors, the deep purples, the dull blues, grays, and dark reds are somber and oppressive. They are funereal in their impression and are often not pleasant companions with which to live. Other colors, such as brown, soft green, and taupe, are restful; they are symbolic of pastoral scenes and tranquillity. They give a quiet dignity to a room.

Colors should, therefore, be chosen in accordance with the character of the room—a character which grows out of the purpose of the room and the traditional or non-traditional manner in which it is treated. Colors should harmonize with the style in which the house and the room are designed. A Georgian, Spanish, or contemporary interior is associated with a traditional color or colors which form satisfactory backgrounds for the furniture, upholstering, and hangings of the period. The mahogany of Chippendale furniture contrasts pleasantly with ivory or white walls, while modern chromium chairs and low couches combine well with the more unusual hues of Indian red and coral green.

The use of the room should help to dictate the selection of colors. The living room should be cheerful but dignified in its colors, while the dining room may be gayer and more decorative. If there is a study, it should be restful—warm and quiet but not drab. The bedrooms may be more personal in their color schemes, because they are more private, and, if they are restless and inharmonious, only their occupants suffer. Bathrooms and powder rooms, occupied only for short periods, offer opportunities for considerable freedom in the judicious use of color in the tile, linoleum, or decorative paper. The colors of the kitchen should be cheerful but neutral so that the housewife does not tire of brilliant or harsh colors during the hours spent in this part of the house.

Composition. The walls, floors, ceilings, openings, and furniture form a complete ensemble, and a room is judged by the manner in which these various elements are combined. While we should visualize and evaluate a room in terms of three dimensions, it is possible to reduce a room to a series of two-dimensional compositions in order to facilitate a study of the

interiors. The furnishings of a room are usually seen against the background of walls, and furniture and wall areas become compositions which are either successful or unsuccessful depending upon the thought which is given to their design. The composition of the walls themselves is, therefore, important.

The areas of walls are established principally by the sizes of rooms—by their length, width, and height. The height is fairly well standardized. Ceiling heights for small houses are usually 8 feet, for medium-sized houses, 8 feet and 6 inches, and for larger houses, 9 feet. Thus, if one is looking at the long side of the average living room, the wall area seen measures 8 feet and 6 inches by about 22 feet. However, the composition of this wall may vary according to the location of the doors and windows, moldings, and wainscots.

If we are considering an interior wall, it is obvious that there may be one or more doors to be placed. Although doors may not be shifted around at will, there is some latitude in their location. They may often be moved several feet in either direction, and it is to this that considerable thought should be given. The locations of doors help to determine the size and position of wall spaces, and wall spaces in turn dictate the grouping of furniture, as discussed in Chapter 28. A pleasing composition of furniture against a wall contributes to the success of interior treatment—an interior composed of backgrounds, furnishings, and accessories. Doors are better placed near the ends of rooms in order to leave sufficient spaces for the locating of important pieces of furniture.

If the walls under consideration are exterior ones, we may find that the problem of locating windows is similar to that of placing doors. Again, windows tend to establish the size and shape of wall spaces, and their position plays an important part in fundamental proportions. The style of the house, whether traditional or "modern," determines the size and shape of the windows. The window may be vertical or horizontal, spaced regularly or concentrated. The position and nature of the window will have much to do with its treatment. If it is a large opening which dominates the room and looks out upon an interesting view, it should be located in the wall so that furniture may be grouped to emphasize its importance still further. The type, color, and pattern of its drapery may also add to its establishment as a center of interest.

If the window is one of several, it may be desirable to allow their size and treatment to be similar and to tie in with the walls and the rest of the room in an inconspicuous fashion. As a rule, windows should blend with the remainder of the interior—not dominate it. Orthodox, vertical windows

should be placed to provide good natural light and cross ventilation, but they should encourage rather than obstruct the logical and natural grouping of furniture. High, horizontal windows in non-traditional houses permit greater freedom in placing furniture and make possible the use of built-in seats, bookcases, or drawers under their higher sills. Windows may, by the use of draperies, set the color scheme of the room, or they may draw the colors of the room together by repeating some of the colors of the rugs, the upholstering, and the woodwork. Above all, windows in their treatment should not be restless in shape, pattern, and color. On the whole, their lines should be horizontal or vertical, dispensing with curtains which loop and swirl in several diagonal directions.

Floors

Materials. Floors have texture, color, and durability, depending upon the material from which they are constructed. They may be built of wood, linoleum, tile, flagstone, or marble, to mention the most popular types. Each material has a quality which renders it suitable for various kinds of architectural treatment and for different rooms according to their use. Wood floors are usually oak which is laid either in narrow widths or in random widths. Floors of the latter type consist of planks with molded joints in imitation of the plank flooring of Early American and Colonial homes, as illustrated on page 247. Wood floors are stained with walnut, burnt sienna, or umber stain and shellacked or varnished for protection from wear. Maple is a very durable wood for floors, but its grain is so dense that it does not take stain easily. Both structurally and aesthetically wood floors are very satisfactory. They do not seem as cold as linoleum or tile and they have a homelike and friendly quality which may be lacking in some other kinds of materials. They may be painted or finished in a number of ways to bring out their grain and color.

Floors of linoleum are rapidly becoming popular throughout the modern house. They received their first test in kitchens and bathrooms, but their durability and wide range of colors and patterns have made them adaptable to all rooms. Plain, dark colors such as dull blue, dark green, or dark red make excellent backgrounds for the rugs of a living and dining room. Their feeling of clean efficiency is sympathetic with the simplicity of non-traditional architecture.

Ceramic tile floors have been used in bathrooms so long that they need no introduction to house designers. They come in a wide range of colors, and may be used also in entrance vestibules or the halls and living rooms of Mediterranean and contemporary, non-traditional houses. Flagstone floors

in the principal rooms of mediaeval English houses harmonize with sturdy oak furniture, while marble floors in the formal halls of Georgian homes seem to go with graceful mahogany tables and chairs. Contemporary dwellings in the "modern" manner seem to find use for all these flooring materials, often employing them in new and novel ways which are worthy of study in magazines and actual examples.

Rugs. As a rule floors are dark in color in order to give stability and unity to a decorative scheme. Usually a room grades from dark to light in a vertical direction; the floors are dark, the walls medium to light, and the ceiling lightest of all in color and value. As the walls form the background for furniture, so the floors are the background for rugs. Rugs should assist the floors in their function of constituting a base for the furnishings of a room; they should not counteract the darkness of floors or compete unduly with the furniture and accessories.

The correct selection of rugs or carpets for a house calls for a thorough study of floor coverings from the standpoint of color, texture, and pattern. Brilliant colors and pronounced patterns appear not to stay on the floor but tend to become too important in the decorative scheme of a room. They form the center of attraction instead of the background for the other objects of the composition. Floor coverings may take many forms, such as the various kinds of rugs and carpets which may be identified by their weave. Those woven with a pile—either short, long, coarse or fine, or with stamped or predyed designs—are the machine-made Wiltons, Brussels, and chenilles, or the hand-made hooked and Oriental rugs. Those made with a flat weave without any pile are the machine-made fiber, grass, linen, and ingrain types, or the hand-made Indian rugs. Some of these rugs are essentially decorative in pattern and color; others, by nature of their materials and manufacture, are plain and uniform in appearance. Each type should be studied for its practical and aesthetic characteristics and compared with the style of furniture and architecture which it is to accompany.

The practical purpose of a rug is to afford a resilient cushion upon which to walk, a means of deadening sound, and a protection for the finish of the floor. However, rugs are also decorative; they help to complete a room by tying all the furnishings together into a harmonious whole. They may be plain or figured, depending upon the effect desired. Plain rugs or carpets of room size are often safest to use and offer fewer appearance problems. In plain floor coverings pattern has been eliminated, texture is fairly easy of solution, and color is the only factor remaining to be considered. However, it would be a dull world if all the floor coverings were plain, and for that reason figured rugs are popular and desirable. As we have already

National Oak Flooring Assoc.

FIG. 67. A beautiful floor laid with random-width oak flooring. An example of complete harmony between floors, walls, interior trim, and furnishings. Traditional Colonial treatment.

indicated, the designs in figured rugs should not create an effect of restlessness. Their colors and patterns should not contrast too violently with those of the upholstering and drapery. This is an easy statement to make, but the condition is one which is realized only with a thorough knowledge of color harmonies and after much study of the principles of creative design. Simply a desire to plan a room or a superficial knowledge of the characteristics of furnishings does not insure an interior which shows evidence of good taste. Well-designed rooms, beautiful in their simplicity, are achieved only through serious and intelligent study.

Whether the floor coverings are to consist of large, allover rugs, or small scatter rugs depends upon the size of the room, the traffic flow, the other furnishings, and the effect desired. Rugs may serve to hide most of the floor itself, if they are room size, or they may be used to emphasize and enhance the beauty of the floor, if small scatter rugs are employed. Large rugs tend to unite the entire room, while small rugs may tie together individual groups of furniture and create various centers of interest. A general center of interest may be secured by a larger and slightly more colorful rug used with the major group of furniture in front of an important architectural element such as a fireplace or a bay window. A boisterous family with a dog may prefer room-size rugs which stay in place, while a quiet family may favor small Oriental rugs for their decorative value.

Ceilings

Unless there is some unusual reason for departing from tradition, it is wise to make the ceilings inconspicuous as far as color and treatment are concerned. Any strong or dark colors, or treatment of surface with texture or moldings, will appear to lower the ceiling and call undue attention to it. As a rule, the ceiling should harmonize with the walls by being simply in a lighter tone of the same color as the side walls. However, it may be the same color as the painted wall, if the wall is not too dark, or like the background of the wallpaper, or it may repeat the color of some other important object, such as the rug or drapery. In recent years, decorators have been experimenting with ceilings which have a strong color or pattern, with the rather unusual effect shown in Fig. 73. This practice has its place when the entire room and all its furnishings are designed with this in mind and when the personality of the owner corresponds to this type of treatment. However, in the average room, the ceiling is usually the lightest tone in the composition.

Chapter 27

THE QUALITIES OF FURNISHINGS

After a well-designed house plan has been developed and satisfactory architectural interiors or settings have been created, the next step is the selection and placing of appropriate furniture, rugs, lamps, pictures, and accessories. It goes without saying that the furnishings should harmonize with the exterior and interior architectural treatment. This does not mean that Colonial houses should contain nothing but Colonial furniture or that non-traditional homes must be filled with chromium tubular chairs. It simply means that all the furniture and accessories should appear to belong together. Several periods have characteristics in common. Most of the phases of the English Renaissance furniture can be used together, while some contemporary furniture retains much of the spirit of the Sheraton and can be combined with it. Characteristics rather than styles should govern selections; the simple should accompany the simple, the ornate should go with the ornate. These characteristics or qualities may be grouped with reference to their purpose, thus:

functional qualities
aesthetic qualities

even though definite assignment may sometimes be difficult to make and certain qualities may belong to both groups.

Functional Qualities

The different items which may be classified as furnishings should have the same desirable qualities which are necessary in architecture. (See page 271.) However, they can all be grouped under one heading—usefulness. Any material thing which is completely useful aproaches a state of perfection according to the standards by which it is judged. This does not mean that utility alone is sufficient; it may be that beauty is also just as essential. Therefore, those chairs, tables, rugs, draperies, and pictures which

contribute to a successful interior may need a number of qualities before they become entirely useful for the purpose for which they were designed and made, or

usefulness requires
correct proportions, proper materials, adequate strength, satisfactory durability, physical comfort, and pleasing appearance.

Some of the furnishings with which an interior decorator works must have all these qualities, some only a few. For instance, a chair should be well shaped, strong, durable, comfortable, and beautiful, a rug simply durable and beautiful, and a picture may serve its purpose by just being beautiful.

Correct Proportions. Furniture must, first of all, function in a satisfactory manner. Chairs are made to be sat upon, tables to hold food, magazines, or lamps, and beds to be slept in. Any peculiarity in the size and shape of these objects which detracts from these every-day uses makes that particular piece of furniture less desirable. The physical proportions of furniture should, then, be adapted to its use in a very practical manner.

Proper Materials. Each item in the general category of furnishings usually has one or two materials best suited to its design, construction, and use. Certain woods are best adapted to various pieces of furniture according to their purpose; different fabrics seem to accompany definite designs; and the weave of some rugs permits the use of desirable and characteristic patterns. In each case the correct material, or the one which will produce the most pleasing design and the required strength, should be selected.

Adequate Strength. Those objects which support should be checked for a strength sufficient to resist the use to which they are to be subjected. Some styles of furniture are too fragile to withstand the treatment which they might receive from an active and boisterous family. The framework of inexpensive chairs may be made of soft cheap woods which will not stand the strain of continuous use. Poor material and workmanship are the twin curses of much of the furniture in the low-price field, and the buyer and decorator can protect themselves only by a thorough inspection of individual pieces.

Satisfactory Durability. This is another important factor which is often overlooked in the selection of furnishings. The finish of tables may mar easily because of poor varnish or lacquer, or the fabrics of upholstered couches may not meet the test of durability owing to the use of inexpensive cotton material where wool is necessary for long life and resistance to wear.

Lamps, rugs, and accessories may also have the test of durability applied to their selection. They should be designed and constructed to resist hard use and also composed of durable materials to counteract the effects of modern ways of living. They should be usable and not depend unduly upon appearance for their appeal.

Physical Comfort. However, it is not enough for furniture to be practical. A chair or bed may be of the correct size and shape and composed of materials necessary to give it strength and durability but it may be lacking in the essential quality of comfort. Comfort is a refinement added to the qualities of proportions and materials. The size may vary just enough to make the object awkward to use or the upholstering may be just a little too soft or hard for its intended purpose. Also a chair which is comfortable for leisurely reading may not be comfortable for a game of bridge. Comfort, therefore, is related to purpose or use.

Pleasing Appearance. In order for furnishings to be completely useful or satisfactory, it is necessary to add the requirement of pleasing appearance. Appearance depends upon the shape, size, color, texture, and surface treatment of the objects under consideration. Sturdy, comfortable furniture or durable rugs which are lacking the quality of beauty and simplicity will never contribute to a completely successful interior. In addition to the need for beauty in individual pieces, there should also be an attempt to achieve a harmony between all the contributing items. There is a homogeneous quality to a successful interior, a quality which may be either formal, informal, quaint, gay, simple, masculine, feminine, dignified, or sophisticated. Unpretentious furniture should go with modest homes, informality should accompany informal exteriors, and dignified groups and arrangements should be found in formal houses.

Aesthetic Qualities

There may be some individuals who will object to pleasing appearance being called a functional quality or discussed as briefly as in the preceding paragraph. Therefore, for the sake of a more orthodox analysis, we shall enlarge our survey of the different factors which contribute to a successful quest for that intangible thing which is called beauty. When, as in this case, the discussion covers the design of furnishings these factors may deal with such familiar subjects as shape, size, direction, texture, pattern, and color.

Shape. Furniture and accessories, like all ordinary physical things, have shape. Their outlines are composed of straight or curved lines or combinations of these, while their general shapes or bulk make them squarish,

cylindrical, bulbous, rectangular, or flat. In shape, chairs, tables, or lamps may be large, bulky, and awkward, or small, delicate, and graceful. The general direction of their mass may be horizontal or vertical. Thus shape is one of the most conspicuous characteristics, because, unless the color is very brilliant, the general mass of an object is one of its most obvious qualities. There should be a conscious effort to secure pleasing shapes—those which are simple and restful rather than those which are complex and restless. An attempt should be made to achieve harmony in the shapes of the various objects in a room. This should not result in monotonous similarity; instead there should be sufficient contrast of shapes to insure the desired amount of variety and interest. (See page 253.) But violent contrasts are to be avoided, for while the graceful form of a lamp may contrast pleasantly with the straight lines of the table, the rococo silhouette of a Victorian chair may be too pronounced for the simple regularity of a Sheraton bookcase.

Size. Competing in importance with shape are size and direction in furnishings. Furnishings may be large or small, vertical or horizontal, depending upon their use, the periods in which they were developed, the scale of the rooms in which they are to be used, and the general effect which is to be achieved. Size has to do with scale, which will be discussed on page 263. Sizes are determined largely by furniture manufacturers, who have based their measurements on practice and custom, but the interior decorator has considerable freedom in the choice of individual pieces. For efficiency apartments, there are small chairs and short tables; for larger homes, there are large sofas and long tables. Furniture may be selected, according to its size, for both comfort and appearance. Usually the correct size is available for each particular location in the home. A piece of furniture that is too large or too small for a room is usually so because of poor judgment in selection or because the original setting has been changed.

Texture. As pointed out on page 273, texture has to do with the quality of the surface of materials. Wood, metal, glass, and textiles appear widely different when seen and when touched. Some philosophies of education would have the student learn about things by *feeling* them, by receiving tactile impressions. These impressions supplement the information secured by *seeing*. Some materials are coarse and rugged; others are smooth and sophisticated. (See Fig. 69.) In a well-designed interior, there should be a sympathetic understanding between the various textures. Sturdy oak furniture usually calls for wool fabrics; graceful mahogany furniture demands damasks and brocades. Similarity instead of violent contrast is thus es-

FIG. 68 (*above*). Illustrating some of the physical qualities of furnishings—size, shape, and color.

FIG. 69 (*right*). Coordination of texture, color, and pattern, using metal, fabric, wood, and rubber tile.

Aluminum Company of America

tablished. There is little place in flush veneered "modernistic" interiors for rough field-stone fireplaces. Likewise, a polished marble fireplace is usually inappropriate for a modest English cottage. Velvet upholstering does not go with hooked rugs—there is too much difference in the texture of the two.

Pattern. Fortunately for the sake of variety in our existence, all the things with which we surround ourselves are not plain. Some have designs and decorations woven or cut into them or painted upon them. Furniture has carving and marquetry, while hangings, draperies, wallpaper, upholstering, linoleum, and rugs may have surface patterns. The motifs in these designs may be naturalistic or conventionalized. They may be designed to look like actual flowers or birds or they may be reduced to a modification of realism which is better suited to the material. In addition, designs may be abstract or made up simply of geometrical forms which are unrelated to animals or trees. These motifs may be arranged in countless ways and may be large or small and regularly or irregularly spaced. They may be pleasing or displeasing according to the size, color, and general design of the figures. On the whole, decoration should be simple and should emphasize the structural lines of the object. The design should suit the material and should repeat, or harmonize with, the shape of the object upon which it is to be used.

Color. Color may be treated from the point of view of the psychologist, of the physicist, or of the artist. If one is to become familiar with the various theories of color, it is necessary to make a thorough study of the subject—one which is beyond the scope of this book. The matter of color will, therefore, be discussed only in the briefest manner.

In order to have color, we must have light. The light waves which are reflected from various objects have different lengths and rates of vibration. When these waves strike the eye, the optic nerve interprets them as colors. There are only three generally accepted primary colors. These are yellow, red, and blue. When any two primary colors are mixed, secondary colors are secured, as:

Primary Colors		Secondary Colors
Yellow plus red	produces	orange
Yellow plus blue	produces	green
Red plus blue	produces	violet

If one primary color and an adjacent secondary color are mixed, the result will be an intermediate color, such as the combining of yellow and orange to secure orange-yellow. The color wheel shows these relationships.

Colors have the physical properties which are known as hue, value, and

intensity. Hue is the color itself—whether it is red, green, or yellow. Value is the lightness or darkness of the hue itself. For instance, the pale yellows are the lightest, the violets, at their full intensity, are the darkest. Intensity has to do with the brightness or dullness of the color. The complement of a color or black may be added to it to neutralize it.

There are many schemes for producing harmonious color combinations. To mention a few, there are the theories of

complementary colors
analogous colors
triad colors

The complement of a color is the one opposite that color on the color wheel shown below. If the two colors are mixed, they will produce gray

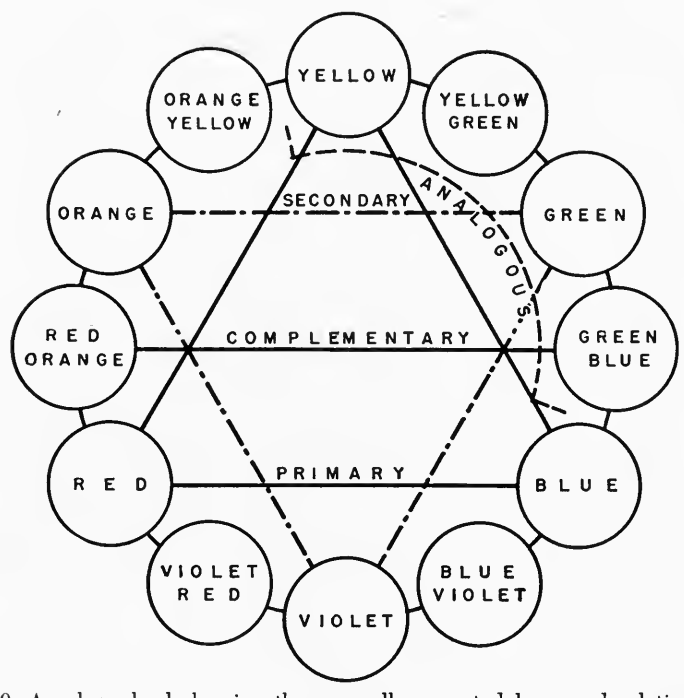


Fig. 70. A color wheel showing the generally accepted hues and relationships.

or neutralize each other. In addition to the single complementary scheme of two colors, a double complementary arrangement of four colors may be used. If the results are to be satisfactory, the designer must have considerable experience with and knowledge of color harmonies.

Analogous colors are those adjacent colors on the color wheel, which

start with one primary color and include those to the next primary color. Thus yellow, yellow-green, green, and green-blue are analogous colors. A color scheme of this kind is very safe to use, but the results will show a little lack of initiative and imagination on the part of the designer.

The very name of triad colors suggests the combination of colors which are to be found at the three corners of an equilateral triangle placed anywhere on the color wheel. Thus orange, green, and violet become harmonious colors according to the triad color scheme.

However, color schemes are not usually worked out in such a mechanical fashion. Use of these theories must be accompanied by skill and good judgment plus a discerning eye. Colors should be chosen for their psychological effect upon the observer. Colors may be warm or cool, advancing or receding, stimulating or restful, and they should be selected with these qualities in mind. As a rule, there should not be an equal balance in the amount and brilliancy of colors. The softer and more neutral colors should form the backgrounds; the strong dominating colors should be reserved for the accents in the smaller areas. Only experience in the selection and combining of colors will give one confidence in the working out of color harmonies.

Furniture Periods

No one period or style of furniture has a monopoly on all the foregoing desirable qualities. One may be stronger than another, or the element of beauty and gracefulness may vary in the different types of treatment. In a study of historic periods, it is found that each period has its own good and bad points—that each has contributed much to the design of present-day furniture. The furniture of this country has been eclectic—derived from certain periods and countries of Europe. On the whole, it has been quite satisfactory from both the practical and aesthetic points of view. The continued use of European derivations and their influence upon modern furniture design attest to their general excellence. And if we are to have Colonial, English, Mediterranean, or "functional" houses, it is desirable that the furnishings harmonize in type and spirit. Let us, therefore, examine a few of the principal periods which have found favor in American homes of the last few decades.

The last phases of the mediaeval period and most of the Renaissance in England, France, Spain, and Italy have been repeated in twentieth century American furniture. Some of this influence has come directly from European examples while some has been contributed by our own adaptations during the Early American and Colonial periods of the history of this country.

Twentieth century furniture has, thus, borrowed from all these sources and also from the Empire and Victorian movements of the nineteenth century. We were so closely bound to the thought and life of Europe during the early years of our history that it was inevitable that we should use their furniture. But the political and economic changes taking place, changes due to realignments of world power through widespread wars, are bringing about an independence in art and architecture—another example of the influence of changing social conditions upon housing and home furnishings.

On the whole, the appearance of furniture has followed closely that of architecture. The architectural details of a period—the columns, pilasters, balusters, moldings, and carving—have usually been reproduced in the chairs and tables. Periods of simple or ornate buildings have produced similar furniture. The English Tudor furniture of the sixteenth century repeated in oak the pilasters, bulbous balusters, and scrolls of contemporaneous buildings. The Jacobean and the William and Mary carried on the same traditions of rugged simplicity. With the beginning of the eighteenth century, a more comfortable and graceful type of furniture came into existence by way of the Queen Anne style with its cabriole leg and fiddle-backed chairs. This type was followed in rapid succession by the products of the skilled English cabinet makers—Chippendale, Brothers Adam, Hepplewhite and Sheraton—who borrowed the delicate details of Georgian architecture and executed them in mahogany and satinwood with veneers and inlays. These influences carried over into our Colonial furniture, and, because of the sturdy grace, refinement, and beauty of these styles, have affected twentieth century furnishings in this country.

The influence of Spanish and Italian furniture of the sixteenth and seventeenth centuries has been conspicuous in recent years, especially in those homes which were sympathetic to the walnut and oak refectory tables, chests, and painted or tooled leather-upholstered chairs of these periods. French furniture of the seventeenth and eighteenth centuries, developed under the reigns of the great monarchs, was usually elaborately carved, gilded, and painted, with elegant upholstering of damasks, velvets, and satins. Owing to these characteristics, the reproductions of the chairs, sofas, and tables of the periods from Louis XIV to Louis XVI have been popular whenever an effect of luxurious ornateness was desired.

Contemporary non-traditional furniture is also following in the footsteps of a similar architecture. It is expressing the machine age by its use of aluminum, chromium, glass, leather, plastics, and plywood. It is streamlined in general shape and surface treatment. Details and decoration have

been reduced to the minimum or entirely eliminated. Utility and comfort have been emphasized as never before in the history of furniture. The relation of the human body to chairs, tables, and beds has become a science which has produced, on the whole, an efficient and beautiful type of furnishings.

The foregoing discussion should indicate how wide in scope is the consideration of the history, design, and use of furniture—subjects of which we have attempted only the briefest mention. It is recommended that the prospective home owner or designer of houses consult a complete and well-illustrated book on furniture for detailed assistance in connection with the design of interiors.

Chapter 28

THE COMPOSITION OF INTERIORS

With the architectural setting of walls, floors, and ceilings established and the general character of the furnishings and the interiors decided upon, it is necessary to arrive at final and satisfactory compositions of furniture and accessories for the various rooms of the house. Countless houses have been ruined by poor taste and faulty judgment in the choosing and placing of chairs, tables, hangings, and pictures. The pleasing impression created by well-designed exteriors has often been dispelled by the confusion of poorly planned interiors. The interior should suit the character of the architecture, and furniture should be selected and combined with a definite scheme of composition and color in mind. A successful interior must be visualized as a harmonious whole. It should show evidence that the designer realizes that furnishings may be arranged according to the principles of design to form a living space which is beautiful in appearance, honest in expression, and correct in character.

The process of interior decoration, which is similar to that of exterior design (see page 271), may be stated as follows:

> Furniture, rugs, draperies, lamps, and pictures have certain physical qualities and should be combined with walls, floors, and ceilings which have similar qualities, in accordance with creative principles, to secure logical and pleasing interiors. Or
>
> *Elements of Design*
> Walls, floors, ceilings, furniture, rugs, draperies, pictures.
>
> *Physical Qualities*
> Shape, size, direction, texture, pattern, color.
>
> *Principles of Design*
> Composition, proportion, scale, contrast, rhythm, unity.

Western Pine Assoc.

FIG. 71 (*above*). Formal balance and conventional dignity. Pine paneling. J. E. Dolena, Architect.

California Redwood Assoc.

FIG. 72 (*left*). Nontraditional simplicity. Utilitarian interior of house shown in Fig. 113.

Lord & Taylor

FIG. 73 (*above*). Contrasting colors in surfaces. Repetition of pattern in paper and upholstering.

Western Pine Assoc.

FIG. 74 (*right*). Restraint and simplicity. Refinement of detail. Godfrey Platt, Architect.

Final Results

Interiors with: utility, beauty, character, honesty.

Principles of Design

The attainment of pleasing interiors cannot be left to mere chance or whim; beautiful rooms are the result of careful planning and a consideration of the principles of design. Furniture and accessories must be composed in a room according to some preconceived and orderly arrangement. The artist works with paint, the landscape architect with trees and shrubs; the interior decorator uses tables, chairs, rugs, and pictures. All these are the physical things which must be arranged by the same creative principles to secure satisfactory balance, contrast, scale, unity, and character. A successful composition will depend upon the ability of the artist—in whatever medium he may be working—to interpret these fundamental principles.

Composition may be either formal or informal, as indicated on page 277. Formal composition or balance is the type which approaches or attains symmetry, in which there is a center of interest and the objects on either side are similar or identical. A secretary may be balanced on either side by identical chairs, or a sofa with pictures above may have similar arrangements of low tables at either end, as in Fig. 71. Formal balance is desirable with the more formal types of architecture, such as the Georgian Colonial or various phases of the Renaissance. Formality finds a more sympathetic reception in larger homes than in small intimate cottages.

The inference is, then, that informality should usually be reserved for small homes and for the informal, unsymmetrical type of house characteristic of the English mediaeval, Colonial "farmhouse," and contemporary non-traditional. Informality does not connote a lack of balance; rather it is an unsymmetrical kind of balance in which a center of interest is established by the use of a large piece of furniture strategically placed, supplemented by smaller objects arranged informally around it. Informal balance in interior decoration is achieved in the same way that a painter composes the various parts of a still life—by placing the major and minor elements in such a way that the eye is held to the composition by the domination of the focal point of interest. There are no exact rules for attaining unsymmetrical balance; rather the designer must arrange his objects and materials about the room in such a way that there is something approaching an equal or satisfactory distribution of mass, size, shape, color, and texture, retaining meanwhile an important or dominant element to serve as a center of interest. Only experience will tell the artist when he has a successful, informal composition on the canvas; only experience will assure the in-

terior decorator that he has an harmonious, informal arrangement of furniture in a room.

PROPORTION is related to the physical properties of things with reference to size and shape. For instance, use has established pleasing proportions for a doorway—the opening may be three feet wide and seven feet high. Columns and cornices have been assigned various proportions, some heavy and robust for sturdy architecture, others slender and delicate for lighter architecture. In a like manner, the interior of a room may have satisfactory proportions, neither too long and narrow nor too wide and low. Windows may have a definite axis, so that the opening is either vertical or horizontal, and not indecisive and weak in its shape. Secretaries and bookcases may have pleasing shapes and proportions, so as to appear neither top-heavy nor incomplete. Rugs may fit the floor area on which they are placed, without having a wide expanse of floor at one side or being crowded at the other. As a rule a vertical picture should hang on a vertical wall space, a sympathetic relationship of similar proportions. A small, light chair beside a large massive table usually indicates lack of consideration for desirable juxtaposition of similarly proportioned objects.

SCALE also has to do with proportions, but it is more directly related to human use. A door which is only five feet high is not practical and is out of scale. A chair whose seat is four feet from the floor is not convenient and is also poor in scale. These are quite obvious violations of scale and are not to be found in a sensible arrangement. Scale can be more elusive than this—it is the subtle adjustment of sizes of objects and of patterns and details to each other and to the setting in which they are to be found. The design in a fabric should be in scale with the chair upon which it is to be used, neither too large nor too small. A lamp should be correctly scaled to the table upon which it is set. The moldings on the legs of a table and the pulls on the drawers should likewise be properly related to the entire ensemble in scale and proportions. In a similar way, furniture should be in scale with the room itself. Large pieces may appear too big for small rooms, and slender objects may be lost in large rooms. Thus the size of the room determines the scale of the furniture, lamps, pictures, and the patterns of the fabrics.

CONTRAST is one of the most important principles with which the designer has to work. Contrast gives interest and variety as we have indicated on pages 284 and 286. We may have contrast of size, shape, color, and texture in a room, but these contrasts should be used discriminately and in just the correct amounts. Otherwise confusion will result. Discord may be found if

National Oak Flooring Assoc.

Western Pine Assoc.

FIG. 75 (*above*). Harmony of scale between architectural details and furnishings.
FIG. 76 (*below*). An interior which is modest in the selection of materials and the character of their treatment. Lester G. Scherer, Architect.

rococo furniture is used with the severely plain, if homespun fabrics are used with fine damasks, or if strongly contrasting colors dominate the room. A glance around a living room should reveal higher and heavier objects alternating informally with those somewhat lower and lighter, each serving as a foil for the other.

Repetition will tend to offset the effects of too pronounced contrast. It is desirable to repeat various forms, contours, woods, colors, textures, and patterns in various parts of a room, as illustrated in Fig. 73. A certain type of chair leg, fabric texture, or bit of bright metal may be too conspicuous or appear to be out of place unless a similar note or accent is picked up elsewhere in the composition. This results in a rhythmic repetition of desirable accents. As a rule, this rhythm is irregularly or informally spaced as distinguished from the regular spacing of windows in a façade or the pattern of a rug.

Unity is that quality which is achieved when harmony exists. It is the culmination of all the principles of composition, because it means that good scale, satisfactory balance, and the correct amount of contrast are present. A dominant center of interest has been established and the other elements of a room fall into place logically and pleasantly. There is no competition between various objects for a commanding position; the minor units are subordinate to the major. When a room is unified, it is simple rather than complex. Orderliness rather than confusion is evident.

Final Results

Rooms are created to be used—they must be utilitarian. But they are not completely satisfactory, unless they are beautiful, or at least pleasing, in appearance. This beauty is achieved by an observance of the foregoing principles of design and by a proper respect for honesty and character. Materials should be used honestly—not in imitation of something else. Linoleum should not be made to imitate wood or tile, and fabrics or metals should not be used where their qualities do not lend themselves to good design. Radio cabinets should not be forced to resemble writing desks, nor should secretaries conceal portable bars. There can also be honesty in the character of rooms and furnishings. Rooms and furniture should reflect the nature of the activities associated with them without pretense or ostentation. Modesty is desirable in small homes rather than attempts to imitate wealthy neighbors. Living rooms should be restful places for relaxation, while kitchens may be streamlined for efficient operation. Furniture, accessories, and draperies should harmonize in appearance. This applies to a single room and also to all the rooms of the house. The shock of pass-

ing from a Colonial living room to a "modernistic" study is likely to be unpleasant and unnecessary. If the room is to be modest and home-like, or suave and sophisticated, all the furnishings should contribute to this effect. A Georgian living room may be sedately luxurious with its rich satins and warm mahogany, while a "space for living" in a machine-like house may be efficiently comfortable with its plain veneered woods and upholstered sofas.

Thus walls, floors, and furnishings, with their various physical characteristics, may be combined according to the principles of design to produce interiors which function satisfactorily and have honest expression, correct character, and that elusive but necessary quality of beauty.

STUDY EXERCISES

1. List the materials used in wall finishes, according to their characteristics, colors, use, and price. Collect samples or illustrations and attach to the foregoing information.
2. Discuss the advantages and disadvantages of figured wallpaper.
3. Collect illustrations of the interiors of rooms showing various wall and floor treatment.
4. Evaluate desirable materials, finishes, and colors for the walls and woodwork of a kitchen, dining room, living room, bedroom, and bathroom.
5. Collect illustrations of interiors showing good and poor balance, scale, and character in the selection and placing of furnishings.
6. Select a rug or drapery which is to serve as the keynote of the room and list the desirable relationships which should exist between rugs, draperies, walls, floors, and furniture, with reference to material, pattern, color, shape, and size.
7. Make sketch elevations at a scale of ½ inch = 1 foot of the interiors of a definite living room, dining room, and bedroom. Show the relationship between wall spaces, windows, doors, furniture, and accessories and give particular attention to good composition.
8. Select a window from the foregoing and draw it at a scale of 1 inch = 1 foot. Make a color study of the adjacent wall, the woodwork, and the drapery.
9. Study and list the characteristics of the various period and non-traditional pieces of furniture for the major rooms of the house. Make tracings or sketches of the principal pieces or collect illustrations.

PART SIX

THE TREATMENT OF EXTERIORS

Chapter 29

RELATION OF PLAN AND EXTERIOR

An Expressive Exterior

The plan of a house is horizontal—it is a two-dimensional diagram. If the lines drawn on paper or the foundations of an actual house are developed upward in a vertical direction, space is enclosed and mass or volume results. We then have a floor, exterior walls, and, with the addition of a roof, a three-dimensional house.

It seems unnecessary to say that the exterior of the house should be determined by the plan, but this is so often not the case that too much emphasis cannot be placed upon this procedure. The exterior should be a true expression of the plan, for, by the massing and contours of the house, the interior arrangements may be read. No building is worthy of the name of architecture unless it is truthful and honest. Too much of our domestic architecture has a false front. Fake gables and meaningless offsets have no relation to the rooms behind them. Roof ridges run the wrong way or opposite in direction to the major axis of the house. Instead of untruths like these, the interior should be expressed on the exterior. Important rooms may be indicated by larger windows, the presence of stairways should be revealed and not hidden, while breaks or changes of direction in plan should be repeated on the exterior. An experienced designer also knows that a good plan permits the development of satisfactory façades. If the horizontal dimensions of rooms are correctly proportioned, their exteriors will be pleasing. Poor proportions in plan will produce ungainly exteriors. It is obvious that a narrow projecting plan unit will become a tall, thin façade area which will be unpleasant in its shape.

Beginnings. Houses are tangible things, and as such must be constructed of physical materials. A house, unless it is prefabricated of unit sections, with the interior and exterior surface an integral section, consists of a structural system covered on each of its two sides with some space-enclosing

medium. The primary function of materials is to provide shelter, to act as a barrier against the unfriendly attacks of man and nature. This is such an obvious purpose, however, that we can quickly pass on to a more interesting study of the appearances of building materials and their contribution to exterior design.

There was a time when houses were built entirely of wood, stone, or brick, by the use of methods of construction centuries old. It is still difficult to improve upon the effects found in the wall surfaces of old Colonial, Georgian, or mediaeval houses. The wood siding of Salem homes, the brickwork of the James River estates, or the stone walls of Cotswold are pleasing beyond betterment. We are told that the age of the handcrafts is past and that we must now depend upon the machine. This is, no doubt, true but, in some respects, unfortunate. While we have gained something by the addition of synthetic materials, we have lost the personal touch of hand-made things. However, if craftsmanship has almost disappeared, perhaps it is well that enameled steel, sheets and blocks of glass, and plastics and pressed compositions are available for the smooth, mechanical, streamlined surfaces which are characteristic of contemporary architecture. In addition, the old materials are being used in new ways. Wood helps to produce beautiful exteriors which are no longer Colonial, brick is built into plain, unadorned but arresting walls, while stone is attached to steel studs in thin veneers instead of being laid in horizontal courses. Old and new materials create new visual impressions. It is the use of materials in an aesthetic sense in which we are now interested.

Chapter 30

THE ELEMENTS OF DESIGN

The design of the exterior of a house is a matter of the organization of all the various elements, which contribute to the completion of the enclosing shell, in accordance with creative principles of design, or:

Elements of Design

Plan pattern influencing: mass, walls, roofs, doors, windows, decoration.

Physical Qualities

Size, shape, direction, texture, tone, color.

Principles of Design

Composition, proportion, scale, contrast, rhythm, unity.

Final Results

Exteriors with: utility, beauty, character, honesty.

The various exterior elements of an architectural composition and their physical qualities may be thought of as:

1. Mass
   three-dimensional volume
   - size
   - shape
   - direction
2. Surface
   two-dimensional areas, which have
   - size
   - shape
   - texture
   - tone
   - color

Detroit Steel Products Co.

FIG. 77. Informal or unsymmetrical massing in a one-story house. Center of interest concentrated at entrance adjacent to projecting wing. L. S. Beardsley, Architect.

MASS

The most obvious feature of a house is its mass, bulk, or volume, and it should receive first consideration. It is desirable to proceed from the general to the particular, from a study of the mass to a consideration of the surfaces which define the mass. We secure our first impressions of a house by seeing its mass, and, for that reason, the mass proportions should be pleasing. Good massing is more important than well-studied details, because no amount of beautiful, delicate moldings can hide an ugly arrangement of volumes. The massing of the various units may be large or small, strong and decisive, or weak and faltering. It may be simple to the extreme or complex to the point of confusion. One of the worst faults in domestic design grows out of the affectation of picturesque massing. Small houses, which normally should consist of one or two units, are broken up into several box-like forms difficult to roof and awkward to compose. The houses illustrated on pages 279 and 285 show examples of various kinds of massing.

In types of architecture other than domestic—such as schools, museums, or churches—it is possible to secure more of the directional quality of mass. The building may be horizontal or vertical in its general shape, or

both, with a vertical tower contrasting with a horizontal unit. This feeling of direction is desirable in residential design, but houses are so often squarish, box-like structures that it is difficult to secure any effect of horizontality or verticality. In massing, direction should first of all be obtained, to be followed by simplicity. Most of the breaks upon the exterior should be eliminated by developing a simple plan contained within one or two plain rectangles. Then these simple masses or volumes should be endowed with desirable proportions. There seem to be no rules for this except those which govern all design and which grow out of an understanding of the principles of composition to be discussed later. However, a study of the admittedly best examples of the stylistic and contemporary periods will show what proportions are considered desirable in their most typical representations. The efforts of unskilled designers to secure picturesque effects, just to be different, are to be avoided.

Surface

Texture. After the general mass of the building, as a simple geometrical form, has been satisfactorily established, it is necessary to proceed to a study of surface treatment. One of the most important considerations, aside from size and shape, has to do with the physical qualities of the space-enclosing materials themselves, namely, texture. It is quite evident that substances give various sensory impressions. Stone may be smooth or rough, wood friendly and familiar, glass severe and impersonal, brick coarse or refined. Some materials are homey, simple, and modest (see Fig. 91), others are suave, sophisticated, and shiny. We should, therefore, exercise care in the selection of our building materials for exterior use, choosing those which will best contribute to the effect desired. They should also be combined in a cautious manner with an eye to the character of the various textures. A modicum of contrast is desirable, but a harmony between surface qualities is even more necessary. Rough timber and brick or glass and steel seem to be affinities because of sympathetic textures and appearances. Other combinations are just as desirable, but they should be the result of thought and study.

Tone in architecture is the variety which results from the contrasts of dark and light or from the gradations from black to white. This creation of light and shade may be secured by the use of doors and windows or by the shadows cast by projecting parts of the house or by moldings and cornices. Tone gives variety and interest to an exterior, and, if the composition is to be satisfactory, the same careful study that was devoted to the general massing must be applied to the details of design. Unpleasant arrangements

Western Pine Assoc.

FIG. 78. A very successful combination of contrasting textures, secured by the use of stone, brick, glass, and wood. Formal composition. Palmer & Landin, Architects.

of openings and cornice can mar, even though they cannot destroy, a beautiful composition of masses and volumes.

Color is also an important factor to be considered in exterior design. The use of color varies with the different climates, its most enthusiastic reception being found in the southern states, where brilliant sunshine gives a sparkle to domestic architecture. Whether in the north or south, color requires intelligent handling and a knowledge of harmonies and values. There is nothing more disturbing than a mixed street of Colonial, English, and modernistic houses, some with red brick façades, blue roofs, and green shutters, others with yellow stucco façades, brown half-timber, and lavender sash. If color is used with a degree of caution and a sense of good taste, results will be satisfactory. A white frame house with its dark roof and shutters, an English house with its warmly colored walls of field stone, or a modernistic house with its areas of simple brick contrasting with light stucco illustrate satisfactory uses of color in domestic architecture. Composition shingles of violent hues, brick walls of uniform and deadly color with black mortar joints, and gaudy splotches of stucco and paint are to be avoided. Often drabness is to be preferred to garishness.

Chapter 31

THE PRINCIPLES OF DESIGN

Everyone wants to build a beautiful house, but people's ideas of beauty differ greatly. Some like simple things; others prefer the ornate. When the average person thinks of a house, it is usually in terms of the exterior appearance. When someone is told that a friend is going to build a house, his invariable question is "What style is it?", showing that the person is thinking about the exterior rather than plan arrangement. This attitude toward domestic architecture is not to be condoned for it places the emphasis on superficial details rather than the fundamentals of good planning. However, an interest in exterior design may be encouraged if it is properly directed. Instead of inquiring first of all about the characteristics of a style, one should think of a house in terms of good architecture. How can well-designed exteriors be secured and how may they be recognized? This is the problem which confronts the practicing architect or the prospective home owner. The architect has the training which enables him to answer the question, and the home owner may acquire an appreciation of good design in houses by the necessary study.

The Matter of Taste

When anything—clothing, paintings, or houses—is judged, the judgment is usually made on the basis of experience. We evaluate a thing in terms of our past experiences with other things of a similar nature. We compare a hat with other hats, a picture with other works of art, and a house with those houses we have seen elsewhere. The new objects are classed as good or bad according to the standards established by those previously experienced. If we have been sensitive to beautiful hats, pictures, or houses, then those which are being judged will be measured by this standard. We thus depend upon our own personal opinion. But too often this remark is heard: "I know what I *like*"; and it really means "I like what I *know*," which may be very little. Some people have little ability

for making an intelligent analysis of things with an aesthetic value because they have no appreciation of the quality of beauty. They lack good taste. Taste is intangible and difficult to describe. Good taste is that ability to evaluate the better things of life. It steers an individual through the maze of social problems and aesthetic decisions. It gives him the assurance and confidence which enable him to appreciate the refinement and beauty to be found in good furniture, clothes, houses, or conduct. However, popular taste is no criterion to follow. The Victorian period of the nineteenth century is supposed to have been a time when popular taste was at a very low ebb, but some of our current architecture is nearly as bad as that of the last century. Witness the insincerity of the present-day pseudo-English house with its false half-timber decoration, the small bungalow with its bad proportions, or the attempts to duplicate a French château in a modest six-room home. No particular period has monopolized bad taste.

If popular taste offers no guide to good design, then upon what can the designer rely in order to insure satisfactory results? The answer is that he should have an understanding of the principles of design. All of the creative arts—painting, music, sculpture, literature, or architecture—are organized according to definite principles. These principles are not so exact as those related to mathematics, for the human element is always present in the creation and judging of art. They have grown from the experiences of innumerable people trained to apply these principles of composition to the various fields of art. They are just as important in creative work as algebra is in science. Houses may be designed or analyzed accurately only with a knowledge of these principles, which we call

composition, proportion, scale, contrast, rhythm, and unity.

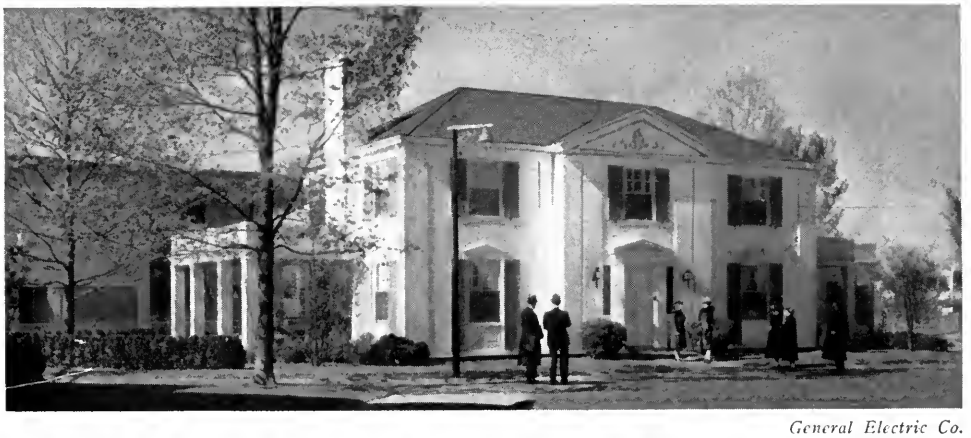
Creative Principles

Composition. The definition of *compose* is "to form by putting together; fashion or construct, as a sentence, a symphony, or a picture"—or, we may add, a house. Because this term seems to cover the entire field of creative endeavor it is given first consideration. The correct interpretation of the other qualities contributes to the success of the composition. A satisfactory composition is secured through balance, which is the achieving of a state of equipoise or the arrangement of opposing forces so that they will neutralize each other. This definition applies directly to symmetrical balance in an architectural composition, such as a façade of a house, and is easily illustrated with a traditional Colonial home, Fig. 79. Here we find the entrance in the center of the composition with either side of

the elevation identical in treatment. Windows are spaced the same on each side of the main axis, and often a porch on one end of the house balances a garage at the other extremity. This is a type of balance easily understood and secured, for it can be reduced to a mathematical process. If there is a slight variation from absolute symmetry, the resulting composition may be called formal balance. This term is applied to those houses which tend to be symmetrical in general massing and appearance but which show a slight lack of symmetry in the placing of openings. As a rule, symmetry can be secured only in the front façades of houses, and then often at the expense of good planning. It is not desirable to allow exterior treatment to control interior arrangements, but symmetry often commits this sin. Usually no attempt is made to strive for symmetry on the other sides of a house, for the presence of rooms of varying sizes and uses eliminates the possibility of such a procedure.

Unsymmetrical composition is that type which cannot be produced by any such mathematical process as is typical of the symmetrical. It is sometimes called occult balance because it is more subtle and elusive. It is an attempt to satisfy the eye by grouping elements of varying sizes and shapes around a center of interest so that one senses, rather than sees, a state of equilibrium. A landscape with its pastures and hills is informal or occult in its composition and it may or may not have the quality of balance, depending upon the disposition of its parts. When the artist paints the landscape, he modifies it to suit his own ideas about good composition. He adds and eliminates, moving trees and houses about until there is a pleasing pattern or a balance of mass, areas, lines, and color. He may use small areas of brilliant colors on one side of the picture to balance a large area of neutral color on the other or he may introduce diagonal lines symbolic of action to compensate for a feeling of tranquillity characterized by horizontal lines.

It is thus evident that it is the eye which must be satisfied when an attempt is made to secure informal balance, but the eye must be trained in the perception of the desired results. However, the following procedure may be offered as a guide. In arriving at a symmetrical composition, areas or masses with identical treatment are placed at equal distances from the center of the composition so that exact balance is obtained. In unsymmetrical composition, a center of interest is established by endowing some major element, usually the entrance, with the necessary importance through the disposition of masses or lines leading to it. This is illustrated in Fig. 81. About this center of interest the remainder of the volume units are arranged so that the eye is led naturally and easily to this focal point of the



General Electric Co.

Pittsburgh Plate Glass Co.

U. S. Gypsum Co.

FIG. 79 (*above*). Formal balance or symmetrical composition. Dignified Renaissance treatment.
FIG. 80 (*center*). Informal composition in the contemporary manner. Interesting massing.
FIG. 81 (*below*). A sloping lot with the resulting unsymmetrical composition.

composition. The larger masses should be near the fulcrum established by this point with the smaller masses at the extremities just as with the children on the seesaw in the playyard. The large child sits on the short length closer to the fulcrum and the small child sits on the longer section farther from the fulcrum.

The foregoing, which has to do with the balance of mass, must be followed by the composition of the elements of a façade. Doors, windows, cornices, and belt courses should be arranged in a satisfactory and interesting manner. As we have indicated, when symmetry is discarded the procedure is not so simple. This may be one reason why Colonial exteriors are often pleasing and why "modernistic" exteriors are sometimes ugly. It is easy to copy the formal compositions and proportions of the past which have been proved to be satisfactory and it is difficult to develop informal arrangements in the modern manner with the slight understanding of creative principles which inexperienced designers are likely to possess. In placing the architectural elements in the exterior surfaces, an effort should be made to avoid crowding and to guard against the creation of unpleasant areas or shapes. Windows should be surrounded by interesting wall surfaces serving as satisfactory enframements while doors should be hospitable in their treatment and location rather than forbidding or uninviting. There should be a pleasant contrast between areas and direction of line but not enough to destroy the unity of the exterior. In short, a successful composition contains evidence of the consideration of all the creative principles.

Proportion is based upon the idea of relationships. The eye compares the sizes and shapes of objects and helps in deciding whether their proportions are pleasant or not. The proportions of geometrical forms, such as circles, squares, and triangles, are easily perceived and they may be classified with little difficulty. Other forms are more subtle and less tangible. The rules of proportion, if any exist, are based largely upon tradition. The doors, windows, and cornices of the Renaissance have definite proportions related to usage, the effect desired, and the material used. The architecture of the Renaissance was of stone, and the moldings and columns were designed for this medium. When the Colonists interpreted these details in wood, the proportions were changed. They were made slender and attenuated and more in sympathy with the physical nature of the material. The narrow rectangular openings of the Classical, Renaissance, Mediaeval or their adaptations in this country were necessitated by the limitations of the stone or wooden lintel. Modern architecture may use the steel beam for a lintel, and thus openings of any reasonable width are possible. The

Western Pine Assoc.

FIG. 82. Excellent scale. The general mass of the building harmonizes with the exterior details. Pleasing proportions. Royal Barry Wills, Architect.

proportions accompanying traditional windows need no longer apply to the horizontal openings of contemporary buildings. Thus proportion is often a matter of association and is pleasing or not depending upon our familiarity with the shapes under consideration.

There was a time when an arched opening must be approximately two diameters high, and the height of a rectangular window should be about one and one-half times its width. Now the entire appearance of architecture has changed so completely that openings of any proportion may be desirable. Now all we ask of them is that they are pleasantly related to other parts of the façade. This applies directly to the modern types of treatment. If the designer is still working with the stylistic forms, it is desirable to retain the fundamental proportions in order that the spirit and general character of the style may not be sacrificed. There should be a uniformity of window treatment throughout the building. This does not mean that windows must be identical in size, but there should be no clash in character. Openings of orthodox proportions and treatment may not go well with a more modern type.

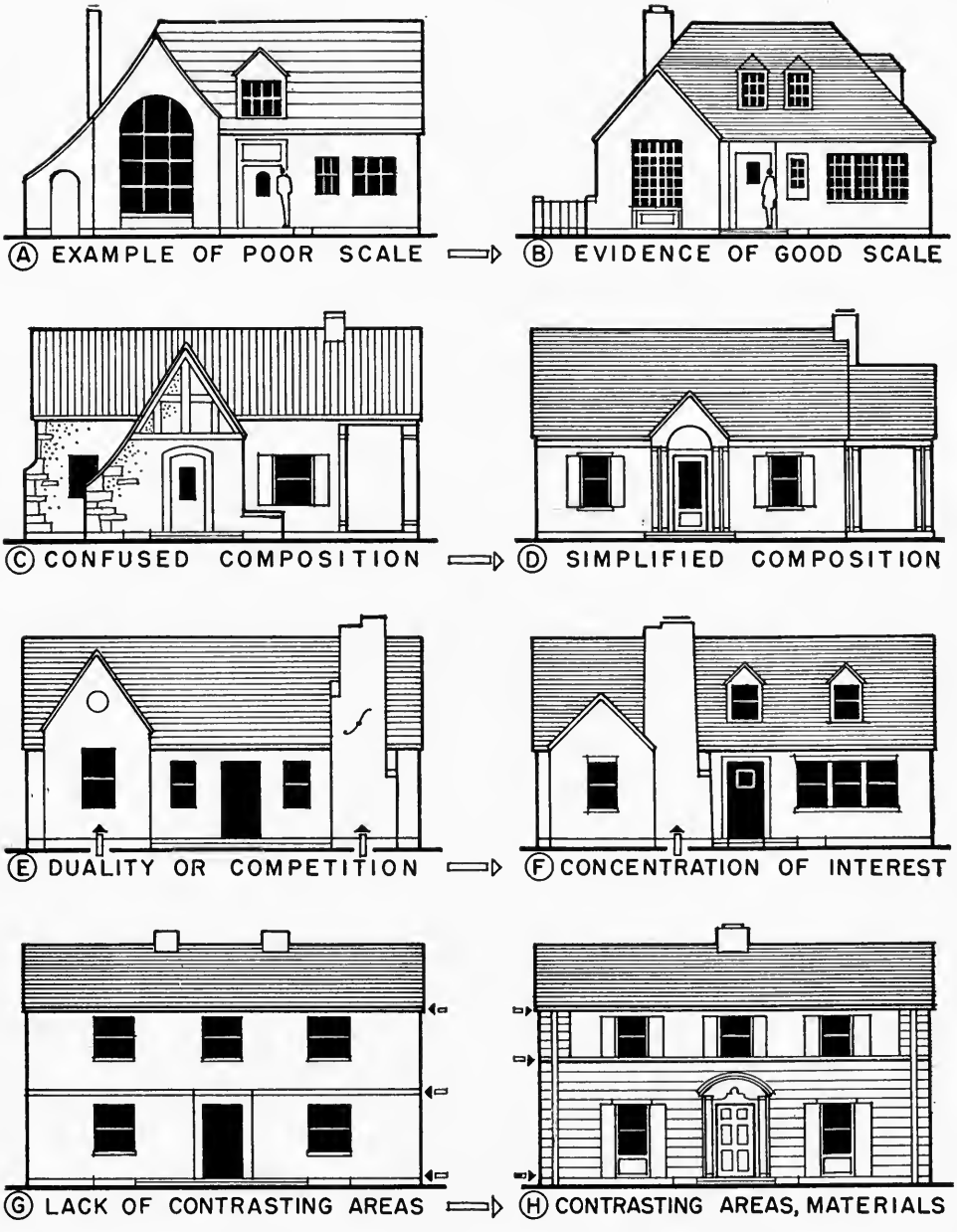
There are no rules, except those established by tradition and experience, for the design of exterior details. If the entire treatment is to be heavy and

solid in character, the cornice moldings and columns should contribute to this effect. If, on the other hand, a feeling of lightness and delicacy is desired, the proportions of all the elements should harmonize.

Scale has to do with proportions which are related to human use. Doors, windows, stairs, and balustrades are in scale if they may be used easily and comfortably. Doorways should be high enough so that one does not have to stoop, and windows should admit the proper amount of light and operate without too much effort. Stairs should be adjusted to the stride of the average person. These are such obvious requirements that usage and practice have established commonly accepted proportions and dimensions with which the entire building public is familiar. It is the more subtle, but still important, forms of scale which demand our attention.

One of the most common mistakes in exterior design is the failure to secure the proper scale between the various parts and details of a building. It takes a discerning eye to insure that windows, doors, moldings, and cornices are correctly related to each other in the matter of proportion. A window may be too large for the area which it is to occupy or for the windows adjacent to it, as in Fig. 83A. It is out of scale. Dormers may be too large and thus make the upper part of the house look top-heavy, or they may be too small and appear to be insignificant. Balconies under windows may be purely decorative and quite obviously not related to human use, and are thus out of scale. If windows do vary in size, which is common and desirable if they are varied with discrimination, they may be kept in scale with each other if the glass divisions are of approximately the same size and character. Large panes of glass in one window and small panes in another usually make one or the other look out of scale, a situation illustrated in Fig. 83A.

Columns may appear to be too slender to carry the load above, especially in some types of modern architecture. Sometimes this is due to our failure to recognize the physical qualities of a new material or a new use of an old material. We have so long been accustomed to heavy piers of masonry that columns of steel, while quite capable of supporting the superimposed weight, seem quite inadequate to the task assigned. The heavy cornice which was in scale with the other elements of a traditional façade is too heavy for the simplified details of a more modern treatment, and thus any moldings used must be reduced in scale. Fireplace chimneys are often out of scale with the remainder of the exterior. Sometimes they are too large and dominate the mass more than is desirable; often they are thin and attenuated and are too insignificant in the composition. Doors themselves are difficult to get out of scale because they come in stock sizes


Ⓐ EXAMPLE OF POOR SCALE
Ⓑ EVIDENCE OF GOOD SCALE
Ⓒ CONFUSED COMPOSITION
Ⓓ SIMPLIFIED COMPOSITION
Ⓔ DUALITY OR COMPETITION
Ⓕ CONCENTRATION OF INTEREST
Ⓖ LACK OF CONTRASTING AREAS
Ⓗ CONTRASTING AREAS, MATERIALS

ILLUSTRATING THE PRINCIPLES OF DESIGN

FIG. 83. Sketches showing poor exterior design in traditional types of houses and methods of improving the appearance of these homes by the application of the principles of design.

which tend to guarantee satisfaction. However, the entire doorway may be out of scale. It may not be important enough to call the proper attention to itself– it may lack side lights, transom, or surrounding moldings or accents. It is insignificant. On the other hand, it may crowd adjacent areas or near-by openings and appear to be out of scale because of its large size. We could continue indefinitely, but these examples are sufficient to show that correct proportions and scale are necessary contributions to a successful exterior.

Contrast is the seasoning of architectural design. It gives spice and variety and is a condition which all of us can understand. Our existence is more pleasant and interesting because of contrast. Winter is different from summer, and the change is usually welcome. Night and day offer dissimilar settings for our activities. A contrasting bit of sweet climaxes a meal of plain foods.

There are many ways in which contrast may be secured in the design of exteriors and interiors of homes. There may be contrast of

mass, shape, direction, size, area, tone, texture, character, treatment, or color.

Without contrast there may be monotony just as food may be tasteless without condiments. But contrast must be added to a design in just the right amount, for it may spoil the composition if it is overdone. Too much contrast causes a restless exterior. As is typical of creative design in general, there are no rules for the securing of contrast. The recipe for a cake is much more exact in its directions than those for the design of a house, but even the recipe is the result of trial and error. It represents a combination growing out of the personal likes of people, based upon their opinions of food. Spanish, Chinese, or Swedish cooking is palatable to the natives of those countries but it may not be to the nationals of other regions. And so our ideas about contrast vary with the social backgrounds of peoples. Some like their architecture highly spiced with many contrasting details, materials, and colors; others prefer a simple diet with plain surfaces and refined treatment. On the whole, however, restraint is usually more desirable than license.

A house may have contrast in the direction, size, and shape of its masses. A projecting vertical wing may contrast with the horizontal main mass of the building, or small porches, garage, or rooms may differ in size from the center unit. There may be an interesting contrast in the treatment of various parts of the dwelling. The center portion may be constructed of brick, smaller projections of wood. Or the upper part may be covered with siding above a first floor of brick, as shown in Fig. 112. A stucco or cement-

West Coast Lumbermen's Assoc.

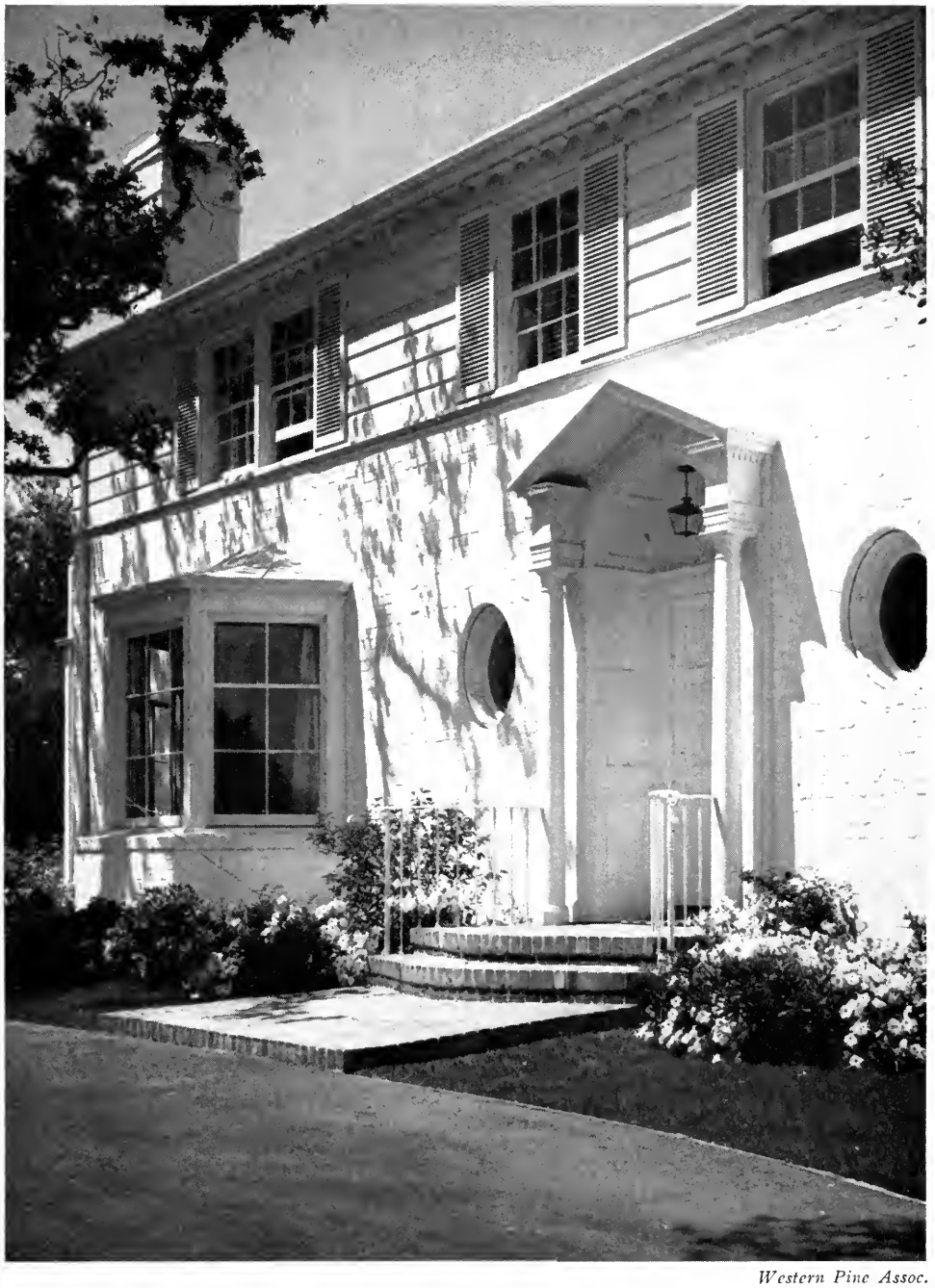
Brick Manufacturers' Assoc. of New York

FIG. 84 (*above*). Contrast in direction of line—vertical and horizontal. W. J. Bain, Architect.
FIG. 85 (*below*). Contrast of colors, textures, materials and masses. See Fig. 119. W. S. Thompson, Architect.

covered wall may contrast pleasantly with areas of glass. There may also be a pleasing contrast between the various colors used on the exterior. The white surfaces of a frame house offer interesting backgrounds for dark shutters or a foil for a green roof. Window sash may be painted a brilliant color in order to provide a desirable accent. Various types of contrast are shown on pages 285 and 287.

The details of an exterior offer an unlimited field for the display of contrast. The openings may vary in size, shape, and direction, but here one is treading on dangerous ground. While contrasting sizes and shapes may be combined, it should be done sparingly and with caution. Rectangular openings are usually the most practical and harmonize with the rectilinear features of the house. As a rule rectangular and arched openings do not go well together so that it might be well to avoid them unless the designer is sure of the results. A square or circular opening is of such a definite shape that it provides a strong accent and should usually be used for the specific purpose of emphasis, as in Fig. 87*H*. One of the simplest and safest ways of securing contrast is by combining areas of different proportions. If horizontal and vertical wall areas are created by the use of a change in materials or the introduction of belt courses or lines of color, these areas may be given added interest if they vary in width, as in Figs. 83*H* and 87*H*. Similarity of areas may be productive of dull and uninspired exteriors.

Rhythm is associated with movement, but architecture is still static in spite of efforts to endow it with the lightness and speed of motion. It is easy to understand why the arts of music and the dance may be associated with rhythm or may even depend upon rhythm for their existence, but why architecture, sculpture, or painting can have much relation to movement may not be quite so obvious. Movement is the basis of rhythm and is characterized by time, which may be fast or slow, or by repetition, which may be regular or accented. Music is an art which appeals to our auditory senses. It is a combination of sounds arranged according to some kind of time or spacing together with the development of melody or harmony. The dance is an art appealing to the visual senses, depending upon the rhythmic movement of figures through the various steps of the polka, rumba, or waltz. Again, it may be fast or slow, regular or accented. Architecture is an art which is seen and which may have rhythm, but buildings themselves are stationary. A building does not travel from its foundations, but there may be a feeling of movement in its composition. The eye travels across the façade of a building just as it does across the surface of a painting or the figures in a piece of sculpture. An unbroken wall has little or no rhythm, but, when details, openings, or breaks are added to the surface, there are



Western Pine Assoc.

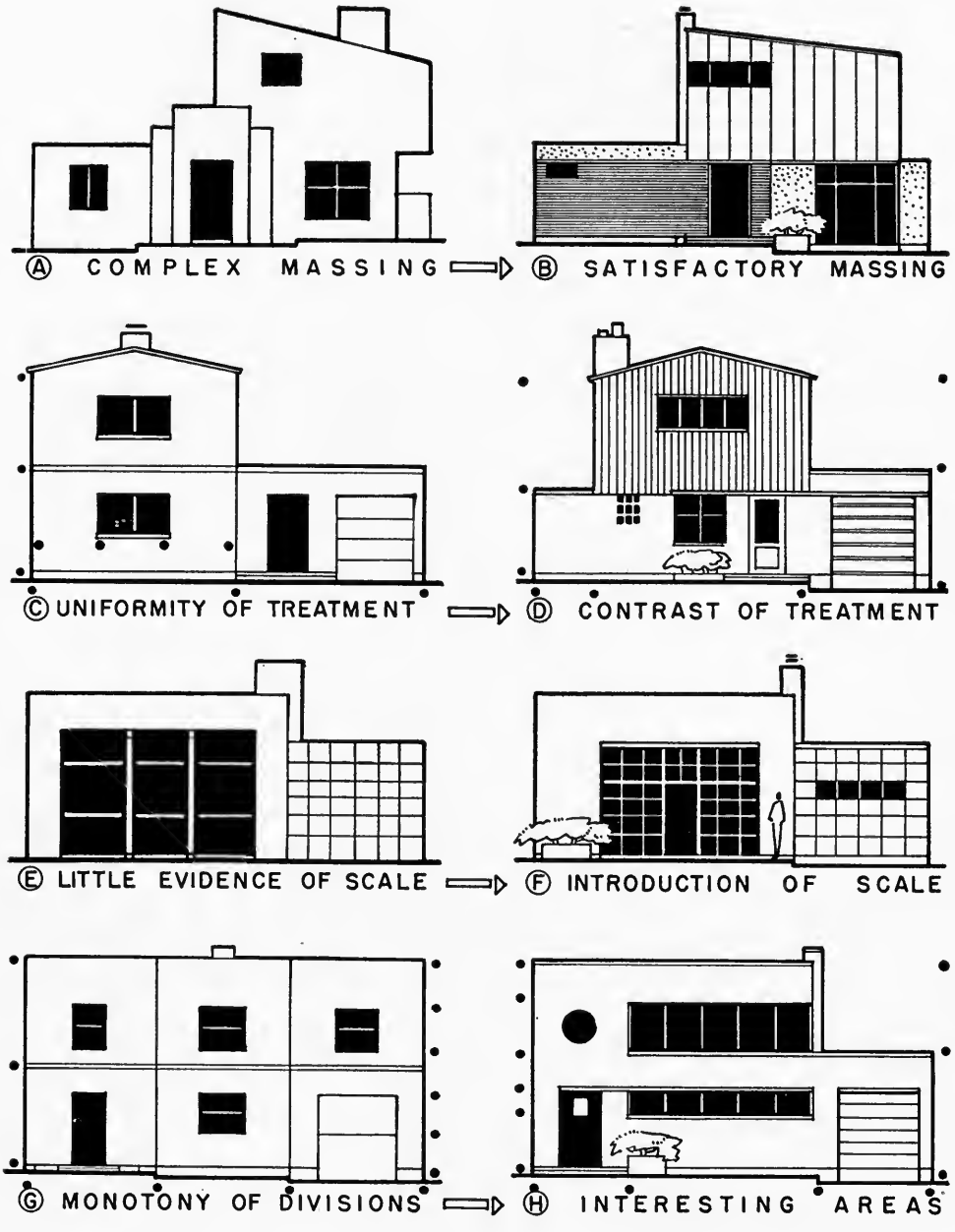
FIG. 86. A pleasing composition showing contrast of wall materials and of size and shape of openings. Interior shown in Fig. 24. P. R. Williams, Architect.

points of interest which catch the eye of the observer. Evenly spaced windows offer regular repetition and provide unaccented rhythm. If the openings and details are composed in such a manner that one recurring motif is more important than the others, the eye pauses there momentarily, and there is accented movement or rhythm. It is, of course, obvious that rhythm is more pronounced in large buildings where there is an opportunity to develop a long façade with many openings or architectural details. In a residence, there are fewer elements with which to work and hence less chance to secure much repetition; but it is desirable to keep the quality of rhythm in mind even in the design of the smallest structures.

This movement in an architectural composition must, of course, be controlled, or it will not be rhythmic. The noise of a symphony orchestra tuning for the concert is unorganized and without arrangement. When these sounds are arranged according to a preconceived pattern, they are productive of harmony and organized movement. If windows and doors are sprinkled on the façade of a building with little regard for spacing, discord is likely to result. If they are composed with a definite scheme in mind, the process may be productive of a rhythmic, unified, and pleasing treatment.

UNITY is the essence of good design. In a unified composition, the elements of balance, proportion, scale, rhythm, and contrast are present in the proper amounts and with the correct interpretations. A nation may be unified or united behind an inspiring movement or leader. A business house may be organized to withstand the effects of depressions. A piece of architecture may possess unity because of well-related elements of plan and exterior.

Unity means that the quality of leadership is present. A squad of soldiers execute their maneuvers under the guidance of an officer. A strong statesman dominates his party and insures its successful existence. And so in an architectural composition there should be the same evidence of strong leadership. There should be a dominant motif, or some part of the building should create a center of interest and hold the attention of the observer. Without this the eye wanders over the exterior, receiving an impression of weakness and indecision. A projecting bay may emphasize the entrance to the house or horizontal lines created by belt courses, and changes of material may lead the eye to this center of interest. A common mistake is the creation of duality by the use of two dominants or important elements. This situation may exist when two large gables of equal size strive for importance or when a wing is balanced by a large chimney at the other end of the composition, as in Fig. 83*E*. This leads to competition, which may be



UNSATISFACTORY AND IMPROVED EXTERIORS

FIG. 87. In the exteriors on the left there is evidence of unsatisfactory massing, monotony of treatment, and lack of scale. These faults are corrected in the drawings on the right.

desirable in the field of sports but is not wanted in architecture. This competition may be eliminated by changing the size and importance of one of the competing elements or by tying the two together by the addition of some central motif which will serve as a leader or a dominating note.

Confusion is caused by the tendency of amateur designers to use too many materials and details. The criticism which can most unfailingly be leveled at domestic architecture is the destruction of unity through confused and complex designs. Contrast has not been used sparingly—the seasoning has caused indigestion. On the exterior of a single house are often to be found many materials and treatment, such as stucco and half-timber, stone and brick, rectangular and arched openings, stylistic and "modern" details, and discordant colors and combinations, as illustrated in Fig. 83C. Forms are not sympathetic to each other. Dormer and gables of different shapes are used side by side and proportions are not repeated in the composition. The modern movement with its plain surfaces, few materials, and simple rectangular openings is a rebellion against the romanticism of picturesque traditionalism. (See page 311.) The unity of modernistic architecture is to be preferred to the confusion of complex stylistic combinations.

The Securing of Character

It is possible to satisfy all the requirements of good taste and the principles of design and still have a building which is lacking in the proper character. The exterior of a house may be composed in a beautiful manner with due regard for balance, scale, contrast, and unity but may not have the commonly accepted character or appearance of a dwelling. Character in architecture may come from

1. Function, or the use of the building.
2. Association, or the influence of tradition.
3. Personality, or the presence of the human quality.

Functional Character. There is an axiom that "form follows function," which may be used to support the cause of either traditional or modernistic architecture. It means that the purpose of a building dictates the development of the plan, and that the plan in turn controls the design of the exterior. School buildings, with their regularly arranged classrooms requiring a large amount of light, are easily recognized because of their exterior treatment, while a museum with blank walls and skylights has a familiar appearance. The exterior form of the building is the outgrowth of the practical requirements dictated by the function or use of the building.

Owens-Illinois Glass Co.

California Redwood Assoc.

California Redwood Assoc.

Three examples of unity secured through simplicity in massing, use of materials, and treatment.

FIG. 88 (*above*). A successful interpretation in the non-traditional manner.

FIG. 89 (*center*). Lines of garage carry the eye back to the entrance. G. P. Simonds, Architect.

FIG. 90 (*below*). Emphasis upon horizontality. Interior shown in Fig. 122.

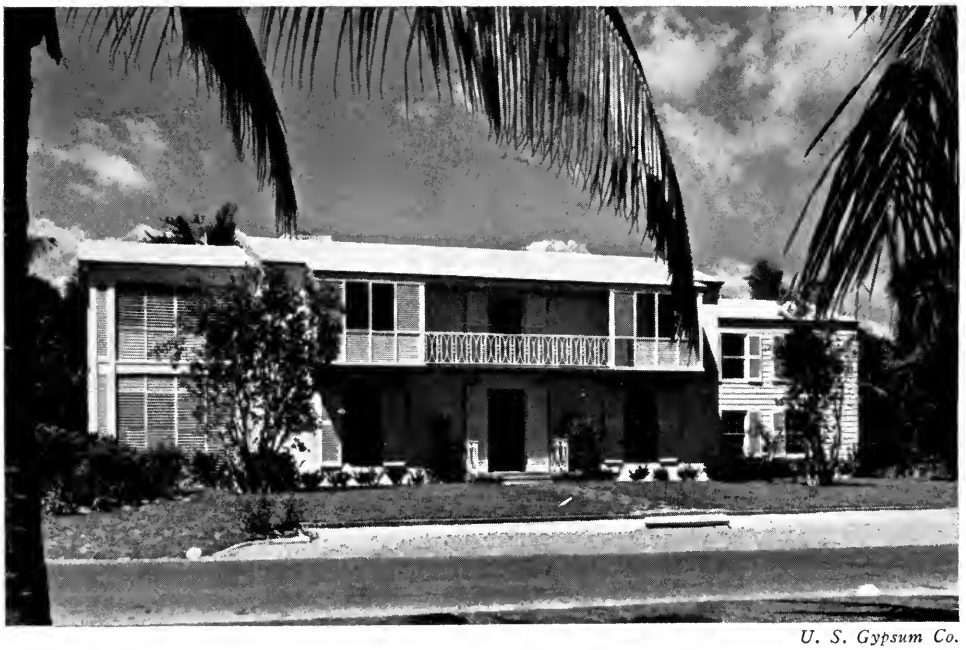
West Coast Lumbermen's Assoc.

General Electric Co.

FIG. 91 (*above*). A frame cottage displaying a simple, modest character. Royal Barry Wills, Architect.

FIG. 92 (*below*). A brick house which is ambitious but dignified. P. M. Duncan, Architect.

General Electric Co.



U. S. Gypsum Co.

FIG. 93. (*above*). A plywood house. Utilitarian and machine-like in appearance. A. L. Kocher, Architect.

FIG. 94 (*below*). A house sympathetic to the exotic setting of the South, rambling and open.

The external character of a house should develop from the plan, as the plan should, in turn, express family needs.

Associated Character. Through long association we are able to identify the various types of buildings of which our architecture is composed. A Gothic or Colonial example with a spire or tower and large windows regularly spaced is recognized as a church. A tall structure with windows arranged in vertical lines is an office building, while a low horizontal composition of brick and glass is likely to be a factory. A small one-unit frame building with shuttered windows can usually be nothing else but a house, if it is judged by associated character. But can we continue to identify buildings by this method? Many of our modern churches of brick or steel and glass are quite unlike their traditional predecessors, while houses are taking on the more mechanized character which we formerly associated with commercial buildings. But are they out of character? If contemporary churches provide an adequate setting for worship and are inspiring in their interior and external effects and if modernistic houses shelter the activities of people in a satisfactory manner and arouse the proper aesthetic enjoyment of beauty, can we say that they are lacking in character because they do not follow traditional forms? Of course no one wants his dwelling to look like a doctor's office or a small place of business. It will not look so if proper attention is paid to planning and to exterior treatment. The requirements of the various activities of man—commercial, domestic, and professional—are quite different; and, if the necessary thought is given to external expression, houses will continue to look like dwellings even though the association is with a new form of architecture.

Personal Character. Individuals have different personalities, which are the outgrowth of their physical and social backgrounds. Some people are popular because they are pleasant in their dealings with others; some are avoided because they are not so considerate. Individuals are cheerful or gloomy, optimistic or pessimistic, voluble or taciturn, graceful or awkward. Like members of the human race, buildings may be stern and forbidding or inviting and hospitable. Houses may be sedate and dignified or exotic and exciting. They may have such qualities as repose, restraint, vitality, indecision, grace, modesty, or grandeur. Some of these are desirable at all times; others are undesirable always. Some qualities may be wanted in certain types of homes and not in others. Architecture should always have repose, restraint, and vitality, and never indecision or restlessness. Small houses should take on an air of modesty, as in Fig. 91, and not attempt to ape their more ambitious neighbors by the use of pretentious details. A

feeling of gracefulness belongs to certain types of treatment and materials, such as a frame Colonial house with delicate details, while a solid, sturdy residence of field stone may appear to grow out of the ground in a vigorous manner. Also, the house should harmonize with the personality of the owner. The low, rambling stone cottage with its inviting fireside provides the proper setting for those who wish to lead a quiet existence with friends and books or tramp the countryside with pipe and dog. The family with newly acquired money would feel frustrated with a modest house of this type, for it would give them little opportunity to display their financial achievements. They would prefer a large house of more sophisticated materials which would help to proclaim the family's importance and to form a setting for its more ambitious activities.

In arriving at a satisfactory design for the exterior of a house, the prospective home owner, student of architecture or house planning, or the practicing architect should have a working knowledge of the principles of design. Mere familiarity with the vocabulary of the designer is not sufficient to insure a good design. A person may be a good critic but not necessarily a creative designer. This design ability comes only with study and experience, and any serious efforts in this direction should be left to those trained in this field. However, the layman can acquire an appreciation of the elements of good design by a study of the creative principles and will be better qualified to discriminate between satisfactory, mediocre, and inferior architecture. The professional designer depends upon a complete understanding of these principles of composition. All should realize that these are the considerations by which the external appearances of houses should be judged. If we rely upon current taste or the superficial details of a style, we are neglecting the more reliable standards which have withstood the test of time. The creative principles of design belong to all the arts, and exterior architecture, as an art expression, can be judged accurately only by these rules.

Chapter 32

THE EXTERIORS OF THE STYLES

We may emphasize the importance of designing the exteriors of houses according to the principles of design, but we cannot evade for long the subject of style or treatment. When a man buys a suit or a woman a dress, the materials and purpose are important but the paramount question is "How does it look?" It may have pleasing lines according to the dictates of good taste, but what term describes it concisely? This is also true of houses. They may be satisfactory in general design, but this may not be enough to identify them. There must be some method of relating them to the past experiences of people, so that individuals may have a visual impression of the proposed dwelling. We thus build in the English, Colonial, or Modernistic manner and describe our houses as such. However, this quest for style should not be too deliberate. The external appearance of a house should be allowed to develop logically from an adequate plan instead of making a plan arrangement conform to an inflexible stylish treatment.

When we discuss periods or styles, it is desirable to remember that the Colonial houses of New England, the thatched cottages of Surrey, or the farm houses of Lombardy developed their peculiar external characteristics became of their plan arrangements, which in turn grew from the manner in which their occupants lived. Exterior style should then be considered as a part of an architectural movement which is definitely related to its accompanying social order. If we do not attempt to adopt traditional treatments too literally, we may be able to use some of the elements of the styles without hampering the progress of our domestic architecture. We may choose those methods of working in brick, stone, and wood, and select those doors, windows, roofs, and moldings which will apply to our types of construction and to the plans which are considered essential to contemporary life. Precedent thus becomes a prop upon which to lean, and,

since many people do not care to be pioneers, there may be some need for this support.

There have been several periods in the history of Europe and America which have influenced the appearance of twentieth century domestic architecture in this country. They may be listed as:

- European
  - English
    - mediaeval
    - Georgian
  - French
    - farm houses
    - minor châteaux
  - Mediterranean
    - Italian farm houses and villas
    - Spanish farm houses
  - American
    - Colonial according to geographical location
      - New England, Middle, Southern, Southwestern
    - Classical revival
    - Victorian

The foregoing suggests the principal influences on the appearance of the various stylistic houses preceding the present movement. From the mediaeval and Georgian homes of England came the inspiration for our Colonial houses of early New England and recent interpretations of this style and for the informal English dwelling. The Mediterranean style entered this country through the homes of the southwest by way of Mexico, while French influence was first felt in New Orleans more than a century ago. In the early part of the nineteenth century the symmetrical but inflexible houses of the classical revival paved the way for recent revivals of the Regency, while confused Victorianism showed the necessity for a more orderly scheme of living and building. With the beginning of the twentieth century, the period of eclecticism began—a period of trying out all the styles which have been mentioned, with special favoritism being shown the Colonial, English, and Mediterranean. We have been accused of plagiarism, but the crime is not quite so bad as it has been painted. While we have borrowed the general forms and details of these styles, the plans of our contemporary houses are quite unlike those of the earlier days. Our copying has not been so complete as some of the leaders of contemporary movements would have us believe. However, we cannot escape the accusation completely. With plans so dissimilar to those of one, two,

or three centuries ago, why should not our exteriors be just as different and as expressive of our culture as those earlier exteriors were of their environment? The non-traditional movements in domestic architecture are attempting to establish some basis for the development of a truly functional house, with, we hope, an effort to retain the aesthetic appeal which characterized many of those homes of the past.

The English Mediaeval

One of the earliest European influences transplanted directly to the United States is "English." England produced two distinct types of domestic architecture, both of which have been reflected in the exterior design of many of our modern homes. One of these was the Georgian, which was the forerunner of our own Colonial of two centuries ago and of the present-day interpretations; the other was the informal mediaeval type mentioned previously. The latter is represented by the cottages of the small merchant and farmer together with those more ambitious houses owned by the country squire. These first-named houses were small and modest and belonged to the soil. The low walls were built of field stone, brick, stucco and half-timber, or various combinations of these materials. The roofs were often of thatch and tile and set at a steep pitch to shed the rain and snow more easily. The windows were small and spaced irregularly according to the disposition of the interior walls. Glass was not easily obtained in those days, and then only in small pieces, and large windows were not encouraged. In addition, the cool climate of England made large openings unnecessary and often undesirable.

While the exteriors of these English houses were often pleasingly low, rambling, and picturesque in their composition, these effects were usually secured at the expense of good planning. We may admire English exteriors but we must be much more critical of English room arrangements. There seems to have been little of the relationship between rooms which we now consider necessary. Kitchens were sometimes a long way removed from the dining room, and other major rooms had to be crossed in order to reach the extremities of the house. Also there appears to have been little regard for regularity and order in planning. Rooms might have corners taken out by projections of one kind or another, and windows were placed almost anywhere in the wall with reference to the floor or other walls. It was, indeed, a picturesque composition of masses and combination of materials; and while pleasing in its informality, it has led to much grief in present-day design. Americans have attempted to transfer too literally the lovely stone cottages of Cotswold to the cities of this country, forgetting

Typical External Characteristics

Ludowici Celadon

FIG. 95. A modern interpretation of the English mediaeval style. Informal massing, tile roof, casement windows, timber posts and beams.

FIG. 96. An Early American house near Ipswich, Mass. Central chimney, overhanging second floor, small windows, frame construction. Modest and simple.

FIG. 97. An eighteenth century Colonial house, Lexington, Mass. A formal, dignified composition with a hipped roof. Renaissance entrance with pediment and pilasters, and shuttered windows.

Typical External Characteristics

U. S. Gypsum Co.

FIG. 98. A contemporary version of the New England Colonial based upon the precedent shown in Fig. 97. Center hall type of plan with familiar exterior details typical of the symmetry of earlier examples.

FIG. 99. A twentieth-century interpretation of the English Georgian. Hipped roof, high chimney, parapet wall instead of a cornice, Classical entrance with columns, and brick walls.

FIG. 100. The Dutch Colonial style as it is used today. Chief characteristics are the gambrel roof, dormer windows, overhanging roof which helps to form the front porch, and frame construction with white siding.

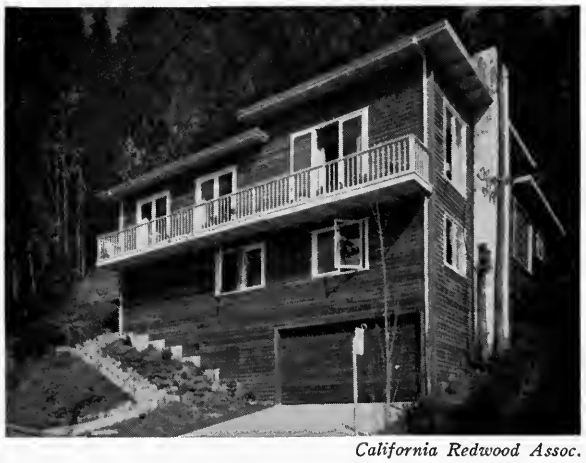
Typical External Characteristics

U. S. Gypsum Co.

FIG. 101. The Colonial style of Pennsylvania was the inspiration for this simple cottage with its rugged stone walls, white trim, dormer windows, and entrance porch. This version of the Colonial is more robust than that of New England.

Western Pine Assoc.

FIG. 102. This Mediterranean type of architecture has been borrowed from Spain and Italy. Its stucco surfaces, thick walls, and flat tile roofs are adapted to the climate of the South. H. P. Smith was the architect.



California Redwood Assoc.

FIG. 103. This may be called a non-traditional house because it does not consciously employ the composition or details of the historical styles. Function and materials influence the design. William W. Wurster, Architect.

that our desire for regularity of planning and the demands of present-day living are difficult to reconcile with the naive, rambling architecture of late mediaeval England.

We have borrowed the exterior treatment of this English style and have sometimes used it in a very superficial way. The half-timber which was structural in England has become purely decorative and very bad decoration at that. A few diagonal and vertical boards, stained to contrast with a stucco background, are nailed to the wall to form awkward patterns, and the resulting falseness is, quite obviously, bad taste. Often, too many materials are used on the exterior. Half-timber, stone, stucco, and brick are employed in a single small cottage in an effort to copy the worst, instead of the best, of the English traditions. Simple masses are broken by changes in surface, by dormers, and by bays in order to secure, in a compact urban house, a picturesqueness which belongs to a low rambling structure of rural England. All of this should not be taken to infer that this English style has no place in American design. The character of the stone walls, the diaper pattern of the brickwork, the use of timber for exterior posts and beams and for interior paneling, the informal placing of windows, and the unsymmetrical massing of volume units may have a legitimate influence on modern design, if used discriminately as in Fig. 95. However, contemporary materials, methods of construction, and ways of living should be allowed to modify this borrowed exterior treatment so that progress rather than archaeological stagnation prevails.

The English Georgian

With the beginning of the eighteenth century, Georgian architecture in England came definitely into existence. It was a phase of the Renaissance movement, which employed forms borrowed from the Classical period in a decidedly nationalistic way. The Georgian house often had a center hall and staircase with rooms arranged symmetrically on either side, a forerunner of our own Colonial plans. The exteriors had brick walls with stone quoins at the corners, large windows regularly spaced, doorways with columns and pediments, projecting cornices, high roofs, and large chimney stacks. It was a dignified, comfortable architecture, rich in restrained decoration both outside and in, and it is not surprising that it found favor in this country soon after its appearance in England. (See Fig. 99.)

The Colonial

Early American. Colonial architecture in the United States took on different characteristics in the various eastern colonies, depending upon

the materials at hand and the social order which existed, although it was all borrowed from the mother country. The first homes which we shall mention are those of the seventeenth century, commonly called Early American. They consisted of a simple rectangular structure built around a central chimney as shown in Fig. 96. The framework was constructed of heavy beams and posts while the walls were first filled with clay or brick and later covered with clapboards or siding. The early houses were composed of a single room on each side of the central chimney with a similar arrangement on the second floor reached by a steep winding stairway just inside the front door. Later rooms were added to the rear and the entire composition covered by simple pitched roofs. The general character of the exterior, with its small leaded-glass casement windows, large wall surfaces, and projecting second floor, is more reminiscent of the mediaeval period than of the Georgian. In recent years an intended interpretation of this Early American architecture has had more than a passing vogue, but it bears little resemblance to that of the seventeenth century. An authentic house of this type would be too dark inside and too uncomfortable in plan for present-day living, so that the overhang of the second floor is one of the few features which has been retained.

The Georgian Colonial may be divided into three phases according to location—that of the New England Colonies, of the Middle Colonies, and of the Southern Colonies, each with its own local characteristics.

New England Colonial. Colonial architecture of New England was essentially of wood, although some brick and stone buildings were erected. The most representative houses belonged to the wealthy merchants and ship owners, and the dignity of the exteriors successfully expressed the importance of the financial position of the occupants. Houses were built by master craftsmen and amateur architects from handbooks of Renaissance details, but, since the material was wood, the details were more delicate than those intended for stone. Slender columns, pilasters, and pediments framed the doors, while windows had moldings of equal refinement. Openings were spaced regularly in the exterior façades which enclosed square compact plans, as in Fig. 97.

Contemporary interpretations of the Colonial of New England exhibit the same general characteristics, as in Fig. 98. The formal type of Colonial house of today is characterized by the center hall, windows with shutters which are usually purely decorative, and simpler moldings and cornices which are largely the result of the increased cost of construction. The porches of modern houses are desirable modifications because of the added comfort, but there is little counterpart for them in the early archi-

tecture of New England. They are simply composed of typical details and illustrate how a style may be modified to suit changing ideas of house planning.

Middle Colonial. In the Middle Colonies, especially in parts of Pennsylvania, there was developed an architecture of brick and stone, rather than wood. The exteriors of these houses were heavier in their treatment, as in Fig. 101, and the cornices and details were simpler so as to harmonize with the rougher walls. The heavy dignity of these Pennsylvania homes, while restful, has not had the popularity of the lighter and more graceful architecture of New England.

The Dutch Colonial style originated in the region around New York City and extended into New Jersey and Pennsylvania. We now think of these houses in terms of white siding but the earlier ones were of stucco, stone, or brick. They were characterized by simple rectangular masses, covered with a gambrel roof which had a wide overhang at the front and back. This overhang later developed into a porch.

The Dutch Colonial has been a very popular type of treatment for small houses in recent years (see Fig. 100), but it has undergone considerable modification. In the early examples the second floor was poorly lighted and ventilated. In order to correct this in modern homes, dormers have been added, either in the form of several small ones or one large shed dormer across the front and the rear. This large dormer, necessary for comfort, has sometimes destroyed the spirit of the Dutch Colonial and has produced an awkward top-heavy composition.

Southern Colonial. In the southern colonies of Maryland and Virginia, we find an entirely different type of architecture from that farther north. It more nearly resembles the Georgian of England in treatment and materials than did the Colonial of New England. Here slave labor encouraged the development of extensive estates with large homes set in the midst of formal gardens. The houses often consisted of a center block, two stories high, flanked on either side by smaller one-story units. They were usually built of brick, and repeated the architectural details of the mother country. The contemporary house with Georgian characteristics displays a familiarity with the symmetrical plans, brick walls, high roofs, and doorways with columns and pediments typical of its English and American predecessors.

The Georgian Colonial style of the eighteenth century has survived because it was beautiful, simple, and honest. It seemed to be an indigenous American architecture ready for readoption after the Classical, Gothic,

and Renaissance revivals of the nineteenth century. It was, of course, another revival when it came into popularity in the twentieth century, but it was one which could be adapted to modern construction and ways of living. It could be built in many of the popular materials, and its symmetry was easily understood and safe to use. Colonial doorways are functional but decorative, as seen in Fig. 118, the windows are adequate for proper lighting and ventilation, while exterior and interior details such as cornices, stairs, trim, and fireplaces are well proportioned and wholly satisfactory. There seems to be no reason for discarding Colonial architecture in its modified form too abruptly. It might be wiser to allow it to merge slowly and naturally with the modernistic movements, to temper some of the impetuosity of youth with the restraint of maturity.

The Greek Revival

After the Colonial period, or from early in the nineteenth century until about 1850, the Greek Revival style was the one most popularly accepted in this country. It was imported from Europe, where it was in vogue in various forms in the different countries. It made use of the details and even the shapes of classical buildings. Banks, churches, public buildings, and houses were built to resemble Greek temples with their columns and cornices. While it was an orderly architecture, it was an inflexible one and quite unadaptable to even the mode of living of the nineteenth century. The old plantation homes of the Deep South, with their tall porticoes, are a possible exception to this criticism for they represent a modified and pleasing use of this style.

In recent years, the Greek Revival details have been used again as decoration for the exteriors of more modern and flexible plans. In another form—that of the Regency of a corresponding period in England—it has been responsible for some rather delightful formal homes of brick with delicate details excuted in ornamental iron. This treatment has been modified until some believe that it has a feeling of stylized modernism.

The French

Other countries of Europe have contributed to the architectural development of the United States, especially France, Spain, and Italy. From all these countries we have borrowed details, from both their modest and their ambitious homes, from the small farm houses as well as the châteaux and villas. The curved dormers, circular towers, steep roofs, and ornate chimneys of French buildings have been used in the compositions of some of the small homes in typical urban subdivisions. In some cases the results

have been satisfactory, but often the adoption of French details has produced an artificial type of treatment.

The Mediterranean

The so-called Mediterranean architecture of Spain and Italy has found considerable favor in some of our southern states. The modest homes of these Mediterranean countries were built of rubble masonry walls which were plastered and tinted in pastel tones. The stucco walls, as well as the windows, were protected from the rain and sun by projecting roofs of tile. These roofs had low pitches because the heavy clay tile could be more easily held in place than with a steep roof, and the lack of heavy rains and snows made the steep roof unnecessary. It was an architecture of small windows and thick walls, which kept out the heat, and of patios, court yards, and arcades for protection from the sun. The houses were designed for comfortable living in a warm, dry climate.

It is not surprising, then, that the Spanish conquerors of Mexico and of the southern fringe of this country should bring this style of architecture with them for use in a climate similar to their homeland. With unskilled labor and rude materials, they built adobe houses around three sides of a courtyard, with the same low-pitched roofs and small windows of the mother country. In the Southwest the houses assumed the character of the pueblos of the Indians, with plastered walls of sun-dried brick, flat roofs, low parapets, and projecting timber ends. This type of Spanish Colonial was being developed even before the English Colonial along the eastern seaboard, but it was not until the twentieth century that it was revived to become a popular style not only in the South where the climate was sympathetic but also in the North where it was less appropriate.

This Spanish or Mexican architecture thus became the inspiration for that house which we now call "Spanish," or more accurately "Mediterranean." It is a curious mixture of Mexican pueblo, Spanish palace, and Italian farm house. It has stucco walls in various colors with textured surfaces. Ornate Spanish Renaissance ornament is often concentrated around the main entrance, while the ever-present courtyard provides space for fountains and wainscots of brilliant tiles. In the larger homes the compositions are rambling and informal with broad arches, low roofs, outside stairs, and circular or octagonal towers. (See Fig. 102.)

The Contemporary

Until the contemporary modern movement in architecture began some years ago, houses were Colonial, English, or Spanish, and they were visual-

ized in terms of the exterior details of these revivals. And then a new style appeared on the architectural horizon, for it has become just as much a style as the Colonial. It was called "modern," for it was strange and different. It grew from a "functional" plan which was often an improvement over the traditional arrangements. It discarded all the old ideas of exterior design. Pitched roofs, vertical and regularly spaced windows, projecting cornices, moldings, and much of the color of domestic architecture disappeared. In their places appeared an architecture composed of cubes and rectangular masses, with flat roofs, corner windows, and large expanses of glass in sheet and block form. It was a reaction against the decorative forms of traditionalism—a reaction so violent that modernism has sometimes reduced architecture to a bleak sterility. However, all non-traditional houses need not be cubistic, barren, and impersonal. They may be interesting, pleasing, and human, as illustrated in Fig. 103. Functionalism and beauty may be affinities, not strangers.

Chapter 33

RESULTANT TYPES OF HOUSES

As the result of plan arrangements, interior treatment, and exterior design, together with the influences of architectural movements and modes of living, various types of houses are now being built. All these dwellings have their own particular advantages and disadvantages. No perfect architecture has been or ever will be developed, for conditions are always changing and the changes seem always to be one step ahead of architecture.

We have often said that social and economic conditions should dictate the development of the houses in which we live. This is a safe premise upon which to proceed, but, now that we have studied planning in all its details, what conclusions have we reached? What changes in our culture and in our domestic architecture have been made in recent years and what changes are imminent? How do the houses of today compare with those of yesterday?

Of course, comparisons are not always fair. The proponents of new movements in domestic architecture are always comparing their creations with the products of the nineteenth century to the natural disadvantage of the latter, forgetting that we are no longer living or building in that manner. A fairer evaluation would be one including the homes of a decade ago and those proposed by a new philosophy. Perhaps there is no need to discard a thing completely just because it is old. Architecture has been a process of evolution. We should improve—not abandon. In choosing a home to shelter our activities we should keep in mind that these activities remain fundamentally unchanged. We cannot escape the

> horizontality of sleeping,
> verticality of eating,
> relaxation of rest, or the
> movement of work.

The only change is in our attitude toward and equipment for doing these

things. So before we cast our lot with any particular architectural philosophy, let us be sure that we are not too far ahead or too far behind the procession. Either extreme of any period is likely to be wrong, either too visionary or too archaic.

Contemporary Houses

Classifications of current trends are always difficult. Hindsight is history; foresight is prophecy. However, it would seem that contemporary houses may be grouped according to their plans and exterior expression as follows:

Traditional
Modified traditional
Non-traditional
  Static
  Kinetic
  Space

The *traditional* house is the twentieth century interpretation of original Colonial, English Georgian, English Mediaeval, or Mediterranean homes. A Colonial house of today is often unlike those of the eighteenth century colonists except in the use of exterior and interior details. It may have a center hall with living room on one side and the kitchen and dining room on the other but it is mechanized and has a degree of comfort undreamed of two centuries ago. Its plan may be less flexible than that of an "open" house but it can be convenient, gracious, and hospitable. It is not a machine for living, but family life can be carried on here in a most pleasant manner.

The *modified traditional* house breaks with the historical styles still more, both in plan arrangements and surface treatment of interior and exterior surfaces. It may retain suggestions of the mass arrangements, door and window types, roofs, cornices, and moldings of the Colonial, English, or French periods, modified to suit present-day materials, methods of construction, and ideas of design. There is considerable freedom in the disposition of rooms and in the placing of openings. This type of house is for those who desire a more flexible plan but do not care to abandon old and familiar forms and details.

The *non-traditional* house bears no resemblance to stylistic plans or exteriors. It is supposed to be based upon the paramount importance of function, in the belief that room arrangement and exterior treatment should develop from climate, site, materials, and human needs. This is, of course, the correct attitude toward house planning, but there may be some question whether any one movement or style holds the monopoly on this ap-

proach. This kind of house is still *static*, as distinguished from those which are kinetic. It has a feeling of solidity, whether it is constructed of wood or masonry. Its walls have apparent thickness and there is a definite contrast between solids and voids. It is still a retreat in which privacy remains a virtue.

The *kinetic* house is based upon the reasoning that modern science has reduced the civilized world to a common level of understanding. Transportation, communication, and education have caused the peoples of many nations to think, dress, eat, sleep, work, and rest more or less alike, so why should their houses not be similar in construction, arrangement, and appearance, with some allowance for climate and topography? This philosophy holds that architecture should have the lightness of speed and motion. This international house is planned from the inside to the outside, with open, flexible arrangements resulting in simple unadorned exteriors of glass and other materials. It represents a definite step away from the static toward the kinetic. Windows and walls tend to merge in treatment and appearance, and informal masses, often supported on metal columns, are characteristic of this movement. Exterior walls are thin, rather than thick, and interior surfaces and arrangements are streamlined for efficiency. It is a machine for living, with some of the appearance of the machines of transportation.

The "*enclosed-space*" house of the future is the ultimate release of man's inhibitions. It discards solidity of architecture and seclusion of person as unnecessary and undesirable and brings man out into the full sunlight of progressive living. Man belongs to the universe, and a section of cosmic space should be conditioned so that he can live in it without being cut off from it. Man is freed from the oppressiveness of static architecture; he is invigorated by the dynamic qualities of a completely kinetic architecture. Steel, glass, and plastics create a mere shell to protect him from the elements, while the advanced contributions of modern science simplify his activities and insure his comfort. In a "space" house, man no longer seeks seclusion and privacy; he becomes a biological specimen living a scientifically regulated life in a laboratory-like structure. There is nothing beyond this—except retreat.

The enumeration of the foregoing degrees of traditionalism and modernism should not suggest the deliberate choosing of a type or style. This has too often been the practice in the past. Home builders have selected a Colonial or English house with the hope that somehow it might fit their needs. Instead of asking "*What* style house should I have?" a prospective home owner or architect should inquire "*How* can I build to care most

efficiently for the activities of a family?" With this approach, there is no such thing as preconceived style. The form grows from the plan which most nearly represents the personality and needs of the occupants. This plan may produce a cozy, personal house with a number of cubicle-like rooms, each caring for an interest or activity, or it may result in an open, flexible type in which the interpenetration of space stimulates an emotional invigoration.

The current struggle is between romanticism and functionalism, or between the ivy-clad cottage and the machine for living. But the conflict will not be long—there will be a gradual union of the two factions. Science will produce a functional structure conditioned for the activities of modern living. Man's emotional nature will insist upon beauty of form, texture, and color. Delight will be added to utility, and a domestic architecture worthy of this age will be developed.

Chapter 34

LANDSCAPING THE EXTERIOR

The exterior of a house is not complete until it is landscaped in a sensible and pleasing manner. Too often no allowance is made in the family budget for this essential step, with the result that a house is left with an unfinished appearance through the lack of proper planting. One must remember that it costs several hundred dollars to buy shrubs, trees, and flowers and to grade and construct good lawns even for the small property. If so much money is to be spent, a well-organized landscape plan should be developed.

House and Nature

The Site. As has already been pointed out in Chapter 15, the building site has definite physical characteristics which should receive first consideration in locating the house. The house should be placed so that it can take advantage of the size, shape, and topography of the lot. These factors should help to decide whether the house is to be close to or back from the street, and whether it is to be in the center of the width or near one side. They, together with the direction of the lot with reference to the sun and prevailing winds, should also influence the ways in which the major rooms face, which in turn determine the position of the lawn and garden areas.

Trees. The person who buys property with large trees already on it is extremely fortunate for they add intrinsic value both in physical comfort and aesthetic enjoyment. The presence of trees should help determine the location of the house, because trees are too valuable to sacrifice unless absolutely unavoidable. It may require considerable ingenuity to adjust a house to existing trees. The adjustment may even result in major changes in the shape and general scheme of the plan, but this is simply one of the to-be-expected steps in the process of design.

The trees which are already on the lot and those which may be added later should be related to the house in such a manner that they will frame it, not hide it. They should not crowd too closely but should give the im-

pression of surrounding the building in a protective manner. Trees should help carry the eye to the center of interest in the composition, which is the house itself. There should be some variety in their size, shape, and texture but not enough to create confusion. There is no need to attempt to surround one's self with the maximum variety of deciduous and evergreen trees. The house should also be located so that the trees will shade the indoor and outdoor living areas, particularly from the afternoon sun. This applies to porches, terraces, lawns, and living rooms, dining rooms, and bedrooms. In studying this feature, we should not take the position of the sun in winter for it is much lower on the horizon then than it is in summer.

The Plot Plan

The General Scheme. If a successful landscape plan is to be assured, it is necessary to make a thorough analysis of the manner in which the property is going to be used. A general scheme, leaving nothing to chance, should be developed along with the house plan. It is quite conceivable that even the plan of the house should be modified in order to secure a more logical and usable outdoor plan. The site should be organized in the same manner that the first-floor arrangements were, or for:

1. Circulation:
   Simplicity and directness.
2. Various activities:
   Outdoor living.
   Active recreation.
      Children's play.
      Adults' exercise.
   Work.
      Service activities.
   Hobbies.
      Vegetable garden.
3. Decorative features:
   Lawn, flowers, shrubs, pergolas.
4. Privacy:
   Seclusion from curious neighbors and passers-by.

If one looks at any plot plan, one will see that the location of the house tends to divide the property into three parts, namely:

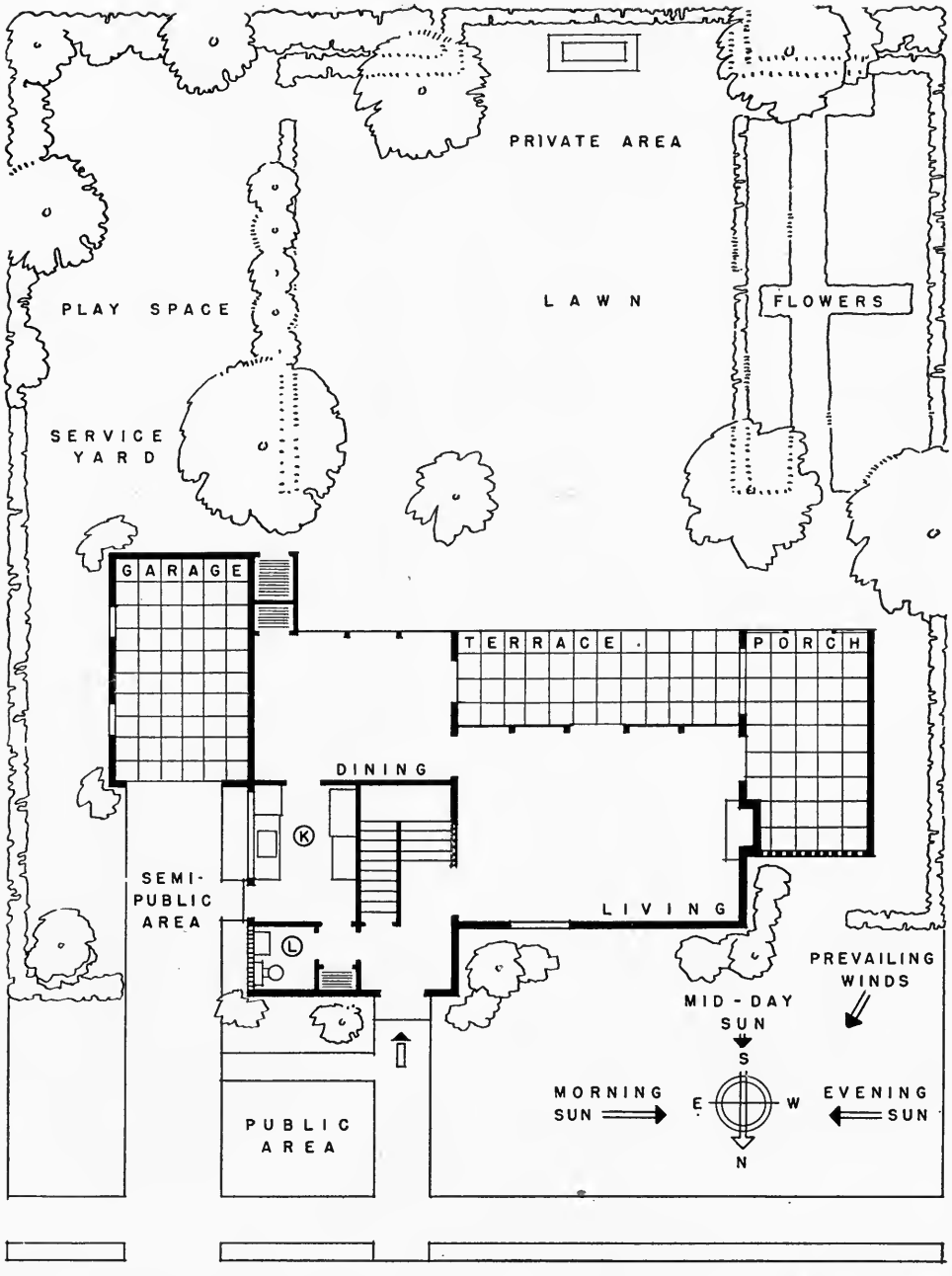
1. The public part, or the front yard with its drive, walks, and lawn.
2. The semi-public part, or the service yard and kitchen entrance, usually at the side of the house.
3. The private part, or the rear lawn and garden for outdoor living.

It will be noticed on page 315 that this arrangement removes the more personal activities of the family from the front porch and front yard to the seclusion of a living space behind the house. This is as it should be, for, in many communities, the era of living casually and informally in front of a friendly group of neighbors is past. In the modern city or even in the small town, neighbors are treated more impersonally and there is a tendency to play, dine, and relax in both indoor and outdoor areas which are screened from the street.

The Public Part. This forms what is probably the most important setting of the house, or at least the one which is seen by the largest number of people. For this reason it usually receives the most attention, sometimes to the neglect of the remainder of the property. The front yard is generally the least personal part of the outdoor area. It turns an impassive face to the public, refusing to reveal the thoughts and moods of the occupants. These revelations are reserved for the more personal touches in the form of flower beds, pergolas, outdoor grills, and pools which are to be found in the private part of the plot plan. The front yard is usually landscaped in a more or less orthodox manner, with a few trees, a lawn area, and some foundation planting. It should, on the whole, be simple rather than complicated in its design. The lawn should not be bisected by too many walks and drives, and most of the planting should be confined to the edges of the area. One of the common mistakes made in landscaping is to have a number of isolated and meaningless trees and shrubs dotting the front yard. Straight lines with a few undulating curves are to be preferred to restless contours in the outlines of walks, flower beds, and groups of shrubs.

The Semi-Public Part. This is the service area to which the "working" part of the public is admitted. It is usually associated with the kitchen entrance, and it is to this that those who deliver groceries, milk, and parcels and those who collect garbage come in connection with these daily chores. It is identified with work, not only by those individuals just mentioned but by the housewife herself. From the kitchen door or the adjacent basement entrance comes the weekly wash to be hung in the drying yard, rugs to be swept, or clothes to be shaken. It should be planned and planted so that it will be hidden from the street and adjacent property, not only to conceal any unsightly features but to protect those at work from the gaze of the curious.

The Private Part. This, corresponding to the living quarters of the house itself, is the most personal part of the outdoor property. Here, during pleasant weather, are carried on the activities associated with reading, con-



A LANDSCAPE AND ORIENTATION PLAN

FIG. 104. A plot plan showing the relationship between the house, lot, and outdoor features. The major units of the plan have southern exposure, commonly accepted as desirable.

versation, raising and enjoying flowers, games, and "getting close to nature." It usually expresses the personality and interests of the members of the family and for that reason does not fall into any particular orthodox pattern.

In studying this part of the property, it is desirable to make a number of sketch plans showing the location of the house and the desirable relationships which might exist between the living room, porches, and lawn areas, as on page 315. These areas must be defined with walks, shrubs, and flowers, and one of the first steps is to secure a pleasing and logical arrangement by their use. In most cases, an open lawn should dominate the composition with circulatory and decorative units occupying subordinate positions. It must be remembered that the art of landscape architecture appeals to the visual senses, just as a painting or a piece of sculpture does. For that reason the landscape architect works with grass plots, walks, pools, summer houses, and plants to create usable and pleasing patterns which have both functional and aesthetic qualities. While he strives for a satisfactory two-dimensional plan, he keeps in mind that the materials with which he is working have three dimensions. The shrubs and trees have height and shape, and the effect which was planned in a two-dimensional fashion on paper or simply visualized on the ground may be completely lost if materials which have the proper size and appearance are not chosen. Landscape design is a matter both of organization and of selection.

Creative Principles. After a general scheme has been established by relating the landscape to the house, it is necessary to study the plan in detail. For small properties, a simple open arrangement is to be preferred to one which is complex. It is better to have one large lawn area with its major axis on line with the house or its main unit, flanked by two or three small and subordinate areas. This plan pattern should then be developed according to the principles which we recognize as balance, contrast, scale, and unity, in order to secure the proper design and character.

In landscape treatment it is possible to have a symmetrical or an unsymmetrical composition or balance. Informal balance is probably more common than formal. More often than not, the plans of both the house and the site lend themselves to informality. A formal composition may appear to be forced and artificial unless the architecture is sympathetic with this arrangement.

A desirable and necessary quality in landscape design is associated with contrast. In a two-dimensional way it is possible to have contrast of size, shape, and pattern, in the width of walks, lawn areas, and flower beds. There can also be contrast in the colors of adjacent groups of flowers. In three-dimensional objects, one may have contrast in the size, shapes, and

textures of shrubs, all arranged rather informally rather than according to any regular and mechanical pattern. This contrast and this variety are desirable but, by way of warning, they can easily get out of control. Like the seasoning in food, they must be just right.

The various parts of a garden should be examined to make sure that they are in scale. They should be adjusted to use and to appearance. The walks should not be too wide for the adjacent lawn areas. The plants should not be too large and coarse for the small spaces which they may occupy, or too small and slender for larger areas. This requires a knowledge of the character and appearance of plant materials.

The opposite of contrast is repetition, which means the repeating of similar shapes of areas and types of planting throughout all or part of the general scheme. A single spot of vivid color in a garden may be too conspicuous, but, if it is seen here and there, the effect may be pleasing.

Any successful composition must have unity, which is just as true of a beautiful garden as of a valuable painting. The simple lines of the landscaping should lead to a center of interest. The house, lawn area, and trees should create vistas, at the terminations of which may be such simple decorative spots as pools, pergolas, sun dials, or benches. A composition of landscape forms may be unified when there are not too many important elements competing for attention. A garden needs a dominant so that the eye will not wander in an indecisive manner.

While the various creative principles are being studied, it must be remembered that the physical setting of the house should be given the proper character. A suburban yard is not a country estate, and it is not desirable to imitate the characteristics of a larger place. All artificial attempts to obtain a picturesque appearance should be avoided. Japanese gardens, extreme rustic effects, and mechanical formality are usually dangerous things with which to experiment. The average back yard, or outdoor living space, should be conceived in terms of simple grass plots, flower beds, and background and border planting.

Circulation. In general, the walks and drives should be direct and as utilitarian as possible. There is little excuse here for studied artistic effects. These circulatory elements usually go to the front entrance, kitchen entrance, and to the garage. They should be business-like and unpretentious, capable of doing the job of taking people and cars to the house in an efficient manner. The paths in the garden may be more sentimental and personal in their appearance, but again they should be simple rather than picturesque. The suggested or implied lines of circulation through the lawn area itself should be free from physical obstructions. One should not have

to dodge trees, pools, and isolated shrubs on a simple expedition from one end of the property to the other.

The materials from which the walks, drives, and paths are built should be in character with the portion of the yard in which they are used. Concrete and asphalt are satisfactory for the public areas which receive most use and wear; brick, stone, and gravel may be reserved for the private area where the personal idiosyncrasies of the family may have influence.

Foundation Planting. For many people this planting is the major problem connected with landscape treatment. A house is "landscaped" when a few evergreens are planted around its base and when a lawn is seeded or sodded and a few shrubs are set out. Foundation planting is one of the most important phases of landscape architecture to be studied, but, paradoxically, it is often the poorest in design and execution. Foundation planting should tie the house to the land and should soften the transition between the horizontal and vertical surfaces. Too frequently it is thoughtlessly done, with the result that a number of ragged, isolated vertical evergreens create a restless appearance.

The composition about the base of a house may be arranged in a symmetrical or unsymmetrical manner with reference to the front entrance, depending upon the massing of the building and the arrangement of the openings. A formal Georgian house may call for a symmetrical grouping of trees and shrubs, while an informal non-traditional house may be better expressed by the use of a similar composition of natural forms. (Fig. 105.)

Foundation planting is used for accents as well as transition. Often it is desirable to have vertical forms on either side of the entrance to give emphasis to this important feature. Thus the low shrubs about the base act as a foil for the larger plants and give interest to the composition. Usually a well-designed scheme shows heavier masses of foliage at the corners of the house to give a feeling of weight and stability to the grouping.

We find ourselves talking in a familiar fashion about the creative principles in this connection as we did in discussing the landscape plan or exterior and interior design. It is impossible to avoid for long a consideration of contrast. In foundation planting, we may have contrast of shape, size, contours, and texture. Rounded bushes may contrast with vertical trees while adjacent shrubs may have large or small or glossy or dull leaves. A tall, slender poplar tree may be used to create a vertical accent and to break the horizontal lines of a long low house. Large plants against the foundations may contrast pleasantly with smaller ones placed in front. In foundation planting evergreens and dense shrubs are usually used in preference to others, for the evergreens do not lose their identity or shape

COMPOSITIONS IN FOUNDATION PLANTING

FIG. 105. Foundation planting is used as a transition between the horizontal ground and the vertical building. It should be in sympathy with the mass and character of the house.

during the winter, thus spoiling the effect which was created in the summer.

Correct scale is just as desirable in foundation planting as in other parts of the property. The shrubs and trees should be in correct relationship to the house and to each other as far as size is concerned. They should not be too low or the house will look tall and inadequately tied to the ground. They should not be too high or the house will appear to be dwarfed and hidden by massive planting.

And, as a parting reminder, the entire composition should help to establish a feeling of unity. Planting should emphasize the center of interest, usually the entrance, instead of competing with it for importance.

The foregoing remarks are only a brief discussion of the fundamentals of good landscape design. They do not pretend to do more than offer suggestions for further investigations. Landscape architecture is a profession which requires years of study. A recognition of its principles is desirable, but facility in their execution comes only after much experience.

STUDY EXERCISES

1. Make small clay models of the exteriors of illustrated houses. Study these models for satisfactory and pleasing massing.
2. Make a notebook of illustrations of advertisements, decorative designs, home furnishings, and exteriors of houses, showing:
   - *a.* formal composition.
   - *b.* informal composition.
   - *c.* pleasing contrast.
   - *d.* good and bad scale.
   - *e.* rhythm, regular and accented.
   - *f.* unity, without competition or confusion.
   - *g.* correct character.
3. Collect illustrations of exteriors of houses which are poor in design. Make sketches showing changes necessary to improve them.
4. Collect three illustrations of the modern interpretations of each of the following types of houses:

   English mediaeval, English Georgian, Early American, New England Colonial, Dutch Colonial, Cape Cod Colonial, Spanish Colonial, Italian, French, non-traditional.
5. Indicate your preference for a definite exterior "style" and give your reasons. Which "style" is most prevalent in your neighborhood?
6. Analyze the philosophy which is responsible for the contemporary non-traditional movement. What major developments are possible?
7. Select a definite site and house plan and make a landscape plan in accordance with the suggestions in Chapter 34.
8. Suggest changes in your own home which would improve the landscape treatment.
9. Collect illustrations of the exteriors of houses and classify them according to their foundation planting.

PART SEVEN

THE SINEWS OF THE HOUSE

Chapter 35

MATERIALS AND CONSTRUCTION

Much of the effort directed toward good planning and sound financing may be lost if poor workmanship or materials are put into the house. Houses should be built to endure—in spite of one theory which would class them with clothing or automobiles to be discarded or traded in after a few years. If we could be sure that houses would be constructed of sections which could be easily dismantled and reassembled after they became obsolete or when the neighborhood deteriorated, we might build in a less permanent manner. However, building less permanently has so far usually meant building poorly, with the result that depreciation soon changes a pleasant suburban development into a blighted area.

Good materials and sound construction reduce the cost of maintenance and prolong the life of the building. It is false economy to cut costs until the structural soundness of the house is jeopardized. It has been found that over a period of years the price of materials and labor necessary to keep a poorly built house in repair is greater than the additional sum necessary to build well at the start. Also, lower interest rates and better loans may be secured on well-constructed houses.

For the purpose of analysis, the various parts of a house may be classified as follows:

Exterior

1. Foundations
   - Footings
   - Walls
2. Structural systems
   - Wood and steel framing
     - sills, joists, studs, rafters
   - Brick
   - Stone

Block units
concrete blocks, cinder blocks, structural tile
Concrete
monolithic
Metal
panels
Prefabricated
wood, metal, concrete

3. Space-enclosing materials
Walls
wood siding, brick veneer, stucco, metal, synthetics, plywood, asbestos siding
Openings
Windows—double hung, casement, glazed areas, glass block
Doors—exterior.
Roofs
pitched
wood shingles, slate, clay tile, synthetic shingles, metal
flat
built-up, asphalt, canvas

Interiors

1. Surfaces
Floors
wood, linoleum, tile
Walls
plaster, plywood, linoleum, tile
Ceilings
2. Millwork
Stairways, interior trim, cabinets, fireplaces, interior doors

Foundations

It is upon the foundations that the strength of the entire structure depends, both literally and figuratively. The foundations must be designed in relationship to the weight of the house and to soil conditions. It is, therefore, difficult to indulge in generalities, for each house is a special case and should be studied by an authority on construction. However, there are commonly accepted practices which may serve as a basis for the design of foundations. If these are not followed, settling, cracked walls, and wet basements may result.

Footings. The footings are the bases of the foundation walls which are widened to form a larger bearing surface and to spread the load of the

house itself over an adequate area. The excavation for the footings should be carried down at least below the frost line, in order to prevent any heaving movement caused by freezing, and also to a depth where undisturbed bearing soil may be found. In the average house and with ordinary soil conditions, the footings should extend about 6 inches beyond both sides of the foundation walls and should be reinforced with steel rods if the soil is soft or loamy. Footings of good concrete should be poured into well-shaped forms, making sure that their lower surfaces are level and smooth to provide a satisfactory bearing against the earth. There should be separate footings for piers and interior bearing walls.

Walls. Foundation walls may be constructed of concrete poured into place or of concrete blocks. The former method is to be preferred in most cases but the latter may be used, if the load is not too great, if the soil is reasonably dry, and if careful workmanship is assured. When damp basements occur with concrete blocks, it is usually due to improper mortar joints on the outside face of the walls.

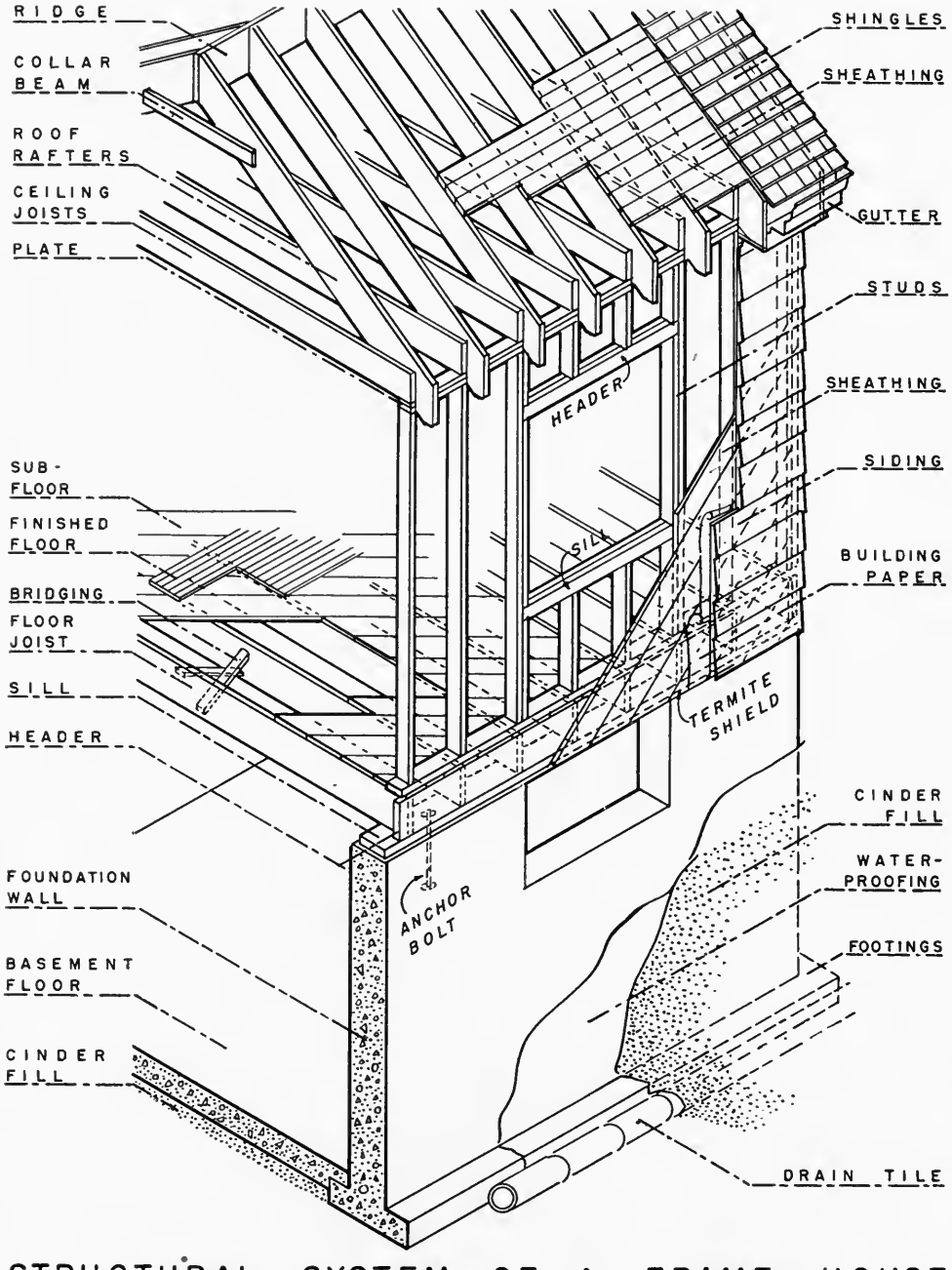
The common practice is to pour concrete foundation walls into wooden forms, the sides of which are spaced 8 inches, 10 inches, or 12 inches apart, depending upon the thickness of the wall desired. In order to insure walls which are structurally sound and a basement which will stay dry, the mixing and placing of the concrete is of utmost importance. The concrete must contain the correct ratio of cement, sand, aggregate, and water, which may vary with the use to which the concrete is to be put and the way in which it is to be handled. In pouring foundation walls, the concrete should be of such consistency that it is easily workable and will fill the forms completely without leaving any porous areas to admit moisture. Concrete walls and floors, no matter where found, should have the following qualities:

Adequate strength under compression and under tension in bond with steel reinforcement.

Resistance to wear and to weather, secured by a hard, dense, impervious mixture.

Proper appearance of exposed surfaces.

These qualities may be secured by correct materials and proportions, careful handling, and protection from heat or freezing during the period when the concrete is curing. After the materials have been combined in the right amounts, care should be taken to see that they do not become separated or segregated during the placing in the forms, and that surfaces are smooth and free from honeycombing. Concrete should be allowed to dry slowly, and excessive or rapid evaporation should be counteracted by a



STRUCTURAL SYSTEM OF A FRAME HOUSE

FIG. 106. A simplified presentation of the foundations and framework of a small house with a suggestion of the nature of its exterior, space-enclosing materials.

covering of straw or burlap, which may be dampened frequently. While various ingredients may be added to concrete to minimize injury from freezing, the best preventive is actual protection from low temperatures.

As an added precaution against wet basements, a line of four-inch, or larger, drainage tile, laid with open joints in cinders or broken stone, should be placed alongside the footings on the outside. This drain should be discharged into a storm sewer or dry well in order that water which might collect about the concrete walls may not build up a pressure and force itself through any weak or porous places. In addition, the outside of the foundation walls may be given a coat of asphalt applied over a membrane waterproofing of burlap, or a coat of waterproof cement plaster. A wedge-shaped joint of tar may also be used between the basement floor and the walls. If these steps are taken in a workman-like manner they should insure a foundation which will eliminate settlement and dampness.

Structural Systems

The walls of houses are usually built according to one or the other of two commonly accepted methods: (1) frame with covering materials and (2) solid masonry. The framing may consist of wood or steel, while the masonry may be in the form of brick, stone, tile, or cinder or concrete blocks. In addition to the foregoing, there are a number of prefabricated units of wood, steel, and synthetic materials which may be quickly erected to form both the structural system and the enclosing surface.

Wood Framing. In spite of new methods of construction and the development of new types of architecture, wood framing continues to be the most prevalent form of building for dwellings. Wood construction is relatively inexpensive, light in weight, easily placed, and extremely durable if properly protected. The framework, shown on page 326, is made up of the following:

Sills, or plates which rest on the top of the foundation walls and receive the joists.

Joists, or the horizontal members which span the room areas and carry the floors and ceilings.

Studs, or the vertical members which carry the upper floors and roof, help form the exterior and interior walls, and hold the space-enclosing surfaces.

Rafters, or the sloping members which form the structural part of the roof.

The various parts of the skeleton of a frame house are generally combined in one of three accepted ways:

the balloon frame, braced frame, and platform frame.

Various Stages of Construction

Western Pine Assoc.

FIG. 107. A story-and-half frame house in the process of construction, showing the wall framing covered with diagonal sheathing and the roof rafters in place. Concrete foundations may be seen at bottom.

FIG. 108. An example of platform framing in a two-story house. The first-floor framing is complete in itself and is surmounted by a plate and header upon which rests the second floor. Notice the bracing above the windows.

FIG. 109. A view from inside a frame house looking out. This shows the vertical two-by-four studs, the diagonal bracing between the latter, and the ceiling joists above.

The distinguishing feature of the balloon frame is the manner in which the wall studs are continuous from the foundation sill to the top plate of the second-floor ceiling. In this way, fewer pieces of timber are used, and shrinking is reduced to a minimum. The braced frame, dating back to the Colonial houses of New England, is characterized by the use of studs which carry from the sill only to the second floor, where another horizontal sill is placed on top of the studs to carry the second-floor joists and studs. The platform frame is placed upon a built-up box sill on top of the foundation walls and is also carried only to the second floor. Here another box sill or header is constructed in order to form a platform for the second-floor joist and studs.

Regardless of the type used, the framing must be strong enough to carry the weight of the floors, walls, and roof, and also of the furniture and occupants. It must be braced against the force of wind and the weight of snow. It should be built of seasoned lumber because, as wood dries out, it reduces in size, causing shrinkage, settlement, and cracks. In addition, efforts should be made to neutralize the effects of shrinkage, because wood takes on and gives off moisture with changes in the humidity. In this connection, it is desirable to equalize and minimize the amount of horizontal timber which appears in cross section in bearing partitions. If vertical studs rest as little as possible on the edges of wide joists, there will be less movement of structural members. This is due to the fact that shrinkage in lumber occurs across rather than with the grain. The balloon-type frame is subject to less shrinkage, since the floor joists at the second-floor line are eliminated as a shrinkage factor and the studs are continuous from the foundations to the second-floor ceiling.

Sills. The sill may consist of a solid member placed flat on top of the concrete wall or a box sill the depth of the floor joist, which is placed on edge. The solid sill should be anchored by means of bolts which are set in the concrete wall. The box sill is filled in with concrete which seals the joint between the framework and the foundation walls. The purpose of the sill is to hold the superstructure to the foundations and to provide a nailing surface for the first-floor joist.

Joists. The joists are the horizontal members which furnish the support for the floors. Insufficient size of joists for the span and load is the chief cause of sagging floors and rattling dishes and furniture. Their size can be estimated accurately only after a consideration of the wood used, the distance to be spanned, and the load which is to be carried. However, the following table will give approximate sizes for yellow-pine joists under

average conditions, assuming a live load of 40 pounds and a dead load of 10 pounds per square foot.

Lumber Size		Spacing on	Maximum	Desirable
Nominal	Actual	Center	Span	Span
2 × 6	1⅝ × 5⅝	16 in.	9 ft.	7 ft.
2 × 8	1⅝ × 7½	16 in.	12 ft.	10 ft.
2 × 10	1⅝ × 9½	16 in.	15 ft.	13 ft.
2 × 12	1⅝ × 11½	16 in.	18 ft.	16 ft.

Usually joists are spaced 16 inches on center, and this becomes the unit of measurement throughout the wood-framed house. Studs and rafters follow this same spacing. The benefits of correct spacing and size are somewhat nullified, however, unless the joists are properly bridged. Bridges are small diagonal braces which are placed from the top of one joist to the bottom of the next in a continuous line from one wall to another. These rows of bridging should not be farther than five feet apart.

On top of the joist is placed the subfloor, which may be regarded as a structural member. It is a rough underfloor laid diagonally to provide additional stiffness. It should be securely nailed to the joists in order to eliminate squeaky floors, and the joints should be broken over and not between joists.

Floor joists should be doubled under bearing walls for additional strength. Joists should be cut as little as possible where this is necessary in the carrying of plumbing pipes and other mechanical equipment.

Studs. These usually consist of two-by-fours set on end with the four-inch dimension at right angles to the line of the wall. When they are used in exterior walls, diagonal corner braces should be fitted between the studs, as shown on page 328, to add strength and stiffness to the entire frame and to resist the strain of wind pressure. Studs should be tripled at corners, and doubled on each side of windows and doors, and at other strategic points. Doors and windows should be topped by a double header set on edge, surmounted by a simple truss composed of vertical and diagonal members to prevent sagging, as in Fig. 108.

After the studding has been set and the framing made for the necessary openings, sheathing is applied to the outside. If this is in the form of narrow boards, it should be placed diagonally to act in the capacity of bracing and may be covered with building paper. The sheathing may also consist of rigid insulation or plywood boards. Either form serves a purpose similar to that of the subfloor, providing strength and a base for the finishing material, whether it is wood siding, brick, stone, or stucco.

Rafters. The rafters are the sloping structural members of the roof.

Their size depends upon the span which they must cover and the material which they must carry. Wood shingles, being comparatively light in weight, require the smallest rafters, probably two-by-sixes or two-by-eights. Slate and tile are heavy and call for heavier members. All rafters should be accurately cut and fitted to the ridge to form a strong junction. Collar beams, or wooden ties, should connect opposite rafters a short distance from the ridge to act as braces and tie the two slopes of the roof together, thus preventing spreading under the dead load of the roof or the load of snow. The roof rafters are covered with a sheathing similar to that applied to the studs for the purpose of receiving the shingles, slate, or tile.

Steel Framing. In a house of the steel-frame type, the wood frame is replaced by one of steel. The steel frame has the same general characteristics and members, but the members are different in size and appearance from those of wood. In general the floor joists, which may consist of light steel channels, I-beams, or trusses, are placed on the concrete foundation walls. A concrete subfloor is then laid on these horizontal members and a finished floor applied to the top of this surface. The steel studs and rafters are arranged in a manner similar to those in a frame house, except that they are spaced farther apart. They are welded or bolted together and are equipped with clips or nailing spaces to take the exterior covering material. Although the cost is greater, they are supposed to provide a stronger, longer-lived structure and one which is less subject to movement and is immune to the attacks of vermin.

Brick. The solid brick wall eight or twelve inches thick is probably the most popular of the masonry walls. (See Fig. 111.) Brick, the oldest of the man-made structural materials, has had a chance to prove its worth in many countries and with many types of architecture. The value of brick construction depends upon three factors:

1. The quality of the brick itself, which may range from the common brick to the hard face brick. Often the harder kinds of common brick give the most pleasing appearance.
2. The quality of workmanship, which includes the kind of mortar and the manner in which the brick is laid. If the mortar is porous and the bricks are not thoroughly bedded in the mortar, winds and driving rains will penetrate a twelve-inch wall.
3. The thickness of the wall, which is perhaps less important, except for minimum structural purposes, than the quality of the materials and the workmanship.

A brick wall may be laid up entirely of brick, or the outer facing of brick

may be backed with hollow tile or cinder blocks. The use of the tile and blocks speeds up the item of labor and provides slightly better insulation than a wall composed entirely of brick. The air spaces of the tile or blocks act to some degree as non-conductors of heat. However, all masonry walls of any type should be furred on the inside by placing vertical strips of wood against the masonry to receive the plywood, metal lath, plaster board, or insulation board. This extra space forms an insulating barrier of dead air and prevents condensation due to a cold wall.

Stone. Field stone is used more often than cut stone for residential construction. The English cottage, the Pennsylvania farm house (see Fig. 101), and even the "modernistic" house employ stone laid up in an informal manner. The appearance of a stone wall depends in great part upon the selection of the stone and the way it is laid. Large pieces should be alternated with thin, flat pieces to form interesting contrast and texture. Stone walls are charmingly informal, but they require good workmanship to prevent the penetration of moisture.

Block Units. These include hollow concrete and cinder block and structural tile. They are economical and fireproof. Their outer surfaces may be left exposed except for painting, as in Fig. 110, or they may be covered with stucco.

Concrete. Concrete houses may consist of those whose structural systems only, consisting of beams and columns, are monolithic concrete (cast in one integral piece) and those whose entire walls, floors, and flat roofs are poured together to form a reinforced structure. Concrete houses are fireproof and verminproof, but the nature of the material calls for a sympathetic treatment in the matter of exterior design. Precast or prefabricated sections of concrete panels for floors, walls, and roofs are also available for residential construction.

Metal. Walls of metal usually consist of interlocking hollow panels 2 or 3 inches thick with an insulating material between the outer surfaces. These panels are both structural and space-enclosing in their function.

Prefabrication. All types of materials have appeared in connection with prefabrication, but as yet wood, plywood, concrete, and metal construction predominate. A more complete discussion appears on page 87, but it may be noted here that success in this connection depends on the ability of the manufacturer to develop a unit which can be economically manufactured in a factory, quickly transported and erected, and easily modified to suit local conditions.

Space-Enclosing Materials

Walls. If the house is a framed structure—that is, built with either a wood or steel frame—it is necessary to select a material or materials for the exterior covering. If the walls of the house are built of solid brick, stone, blocks, or prefabricated units, the structural system is synonymous with the space-enclosing material.

The most common and popular of the exterior covering materials at present are:

wood siding, brick veneer, stucco, plywood, synthetic materials.

Wood Siding. One of the materials most characteristic of the exteriors of American houses is wood siding. The Colonial builders of New England used it extensively, and the excellent condition of the houses of that period attests to the permanency of their wood as a building material. Many of these walls have never been painted. Today paint or preservative stain is used for greater protection and for the introduction of colors which are not so easily obtained by the use of other media.

Siding or clapboards are usually placed horizontally and lapped one over the other to form a water-tight joint, as in Fig. 113. They come in various widths and are, in most cases, laid up with either 4, 6, or 8 inches exposed. As a rule, they are beveled, or thicker at the bottom edge than at the top.

The two main divisions of woods are the softwoods from the needle-leaved trees, such as pines, cedars, firs, and spruces, and the hardwoods from the broad-leaved trees, such as oak, maple, and birch. The softwoods furnish the lumber for most of the siding, sheathing, framing, subfloors, shingles, and exterior trim, while the hardwoods give the oak- and maple-finished floors and unpainted trim. The woods most frequently used for siding are pine, cypress, cedar, and redwood.

Brick Veneer. When brick is used as a surfacing material only, the resulting combination is known as brick veneer. It is truly a veneer applied to the outside of frame construction, as shown in Fig. 112. The four-inch brick wall rests on the concrete foundation and is laid up so that there is an air space of about one inch between the brick and the building paper which covers the diagonal sheathing of the stud wall. The brick should be tied or fastened to the sheathing with non-corrosive metal ties, placed about every seventh course.

A brick-veneer exterior combines the permanency and beauty of a brick wall with the insulating quality of a four-inch stud wall. Maintenance is

Detroit Steel Products Co.

Brick Manufacturers Assoc. of New York

FIG. 110 (*above*). The use of concrete blocks for exterior walls. Alden Dow, Architect.
FIG. 111 (*below*). Walls of brick in a successful interpretation of Colonial. J. W. Clyde, Architect.

California Redwood Assoc.

FIG. 112 (*above*). A combination of brick veneer and stained siding. Plan shown in Fig. 17.
FIG. 113 (*below*). Redwood siding used in contemporary manner. See Fig. 72. R. M. Brown, Architect.

reduced to a minimum, and a wide choice of colors and effects is possible. A word of caution about the selection of brick is necessary at this point. The color and texture should harmonize with the design. Although the red and brown colors predominate, it is possible to secure brick which are buff, gray, tan, or purple. The textures vary according to the method of manufacture and the character of the shale or clay. The brick may be smooth, as it comes from the dies, or rough by reason of the wire-cutting process. A brick wall may be ugly in its use of dark brick of a uniform color laid in black mortar and also deadly monotonous in color and texture. On the other hand, a brick wall can be one of the most beautiful and interesting surfaces imaginable, especially if a brick is used which has some variation in color and texture. The soft pink and salmon walls of old Virginia houses have a charm which is often lacking in the mechanical effects of a modern building. This is not the fault of brick as a material—it is the result of unintelligent use and poor taste. Brick should harmonize with the exterior treatment in color and texture. Traditional styles should be interpreted wtih brick similar to those used during these particular periods, while non-traditional architecture should have its streamlined effects emphasized by the choice of a suitable brick. The designer cannot depend on a superficial knowledge of such matters as a guide. A thorough study of the best examples of the past and present and an understanding of color harmonies are necessary for the selection of the proper brick for a particular design.

There is a growing tendency in contemporary work to paint the brick walls of houses white. It must be admitted that a white house set amidst green trees is a beautiful sight, but the item of upkeep in the cities, owing to the necessity of frequent painting, is considerable. In addition, the natural beauty of a brick wall—a beauty which comes from the color of the brick and also from the pattern—is lost when it is covered with paint. For instance, brick masonry, especially an eight- or twelve-inch wall, must be "bonded" by turning every other brick or frequent courses so that their ends show. Any number of bonds or patterns may be worked out with these end bricks or "headers," adding an interest to the wall which should not be lost by the use of paint.

Stucco. A stucco wall is characteristic of the English mediaeval, the Mediterranean, and the contemporary non-traditional styles. Stucco may be applied to tile, concrete, or cinder block walls, or to metal lath or a wood frame. If the latter method is used, it is best first to apply rigid board sheathing to the studs to be covered with waterproof building paper and finally with metal lath and stucco. The use of stucco permits the introduc-

General Electric Co.

U. S. Plywood Corp.

FIG. 114 (*above*). A contemporary house of concrete, steel, glass, and plywood.
FIG. 115 (*below*). The simplicity of cottage architecture interpreted in plywood.

tion of color into the surface material and allows painting after fading or discoloration. Stucco finish is satisfactory if the framework is rigid, if the proportions of the ingredients are correct, and if the workmanship is good.

Plywood. Each year brings to the market new products in the form of plywood or wall board sidings. These may be made of asbestos or of several layers or wood veneer held together by waterproof resinous compounds, as in Fig. 115. These materials have the advantage of being light, easily erected, and sympathetic with modern design.

Miscellaneous. The future of housing promises many experiments with old materials in new forms and new synthetics yet unheard of. Metal exteriors, either painted or enameled, have already become conspicuous in exterior design while synthetic stone offers textures and colors not possible in the regular materials of nature. The many plastics now being developed may find a prominent place as space-enclosing materials.

Insulation. The purpose of insulation is to retard the movement of heat, either outward in the winter or inward in the summer. It may consist alone of some material placed in the walls and roofs or it may be supplemented by weather stripping, double glazing, and the shading of windows from the summer sun. Insulation is not a cure-all; one's discomforts do not vanish completely with the installation of some material which is a poor conductor of heat. However, insulation is worth the added expense, and only the very inexpensive houses are now being built without it. Insulation affects definite fuel savings in the winter and helps to keep the house cool in the summer. But it cannot eliminate the results of prolonged periods of heat which are characteristic of many of our middle-west and southern states. After several days of hot weather, the accumulation of heat in a house is very noticeable. This built-up temperature is not readily lowered unless the nights are cool and the heat can be dispelled with an attic ventilating fan.

There are four popular types of insulation:

1. Loose type, consisting of rock wool, granules, and various fibers. The mineral wools are fire-resisting and may be blown into the walls of an old house. In a new house, they are usually packed in by hand during the process of construction and form a four-inch barrier against undesirable temperatures.
2. Blanket type, in the form of flexible blankets of fiber which are fastened in the spaces between the vertical studs or the roof rafters.
3. Rigid board type, consisting of fiber board in large sheets which may also be used as a plaster base and for sheathing. (These three types depend

upon the small air pockets in their porous composition to act as retardants of heat.)

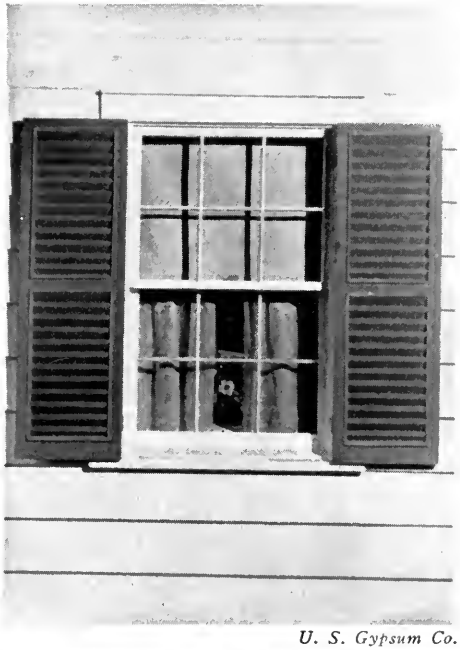
4. Reflective type, which depends upon sheets of metal foils placed between the studs to reflect the radiated heat. They reflect the heat back into the house during the winter and keep it out in the summer.

There are a number of variable factors and problems in connection with insulation, one of the most conspicuous being associated with condensation. In these days of winter air conditioning, the excess moisture in the house passes through the exterior walls. If this moisture is stopped by heavy waterproof building paper in the outer surface of the wall, it may condense on the insulation, thus rendering it partially ineffective. To counteract this difficulty, the waterproof barrier may be erected between the warm interior and the insulation, omitting the barrier in the outer part of the wall.

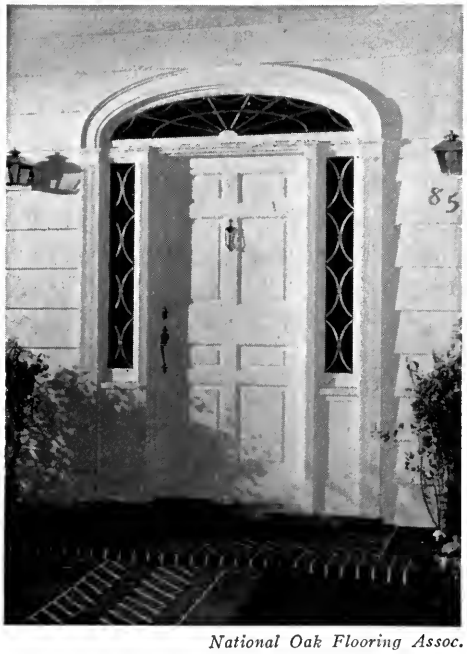
Openings. These consist of the obvious doors and windows, which in turn are composed of (1) glass and its frame and (2) the general frame and trim around the opening. For many years the dimensions and details of openings were very much standardized, but with the advent of the contemporary influence, doors and windows are more individualistic. The size and importance of the frame have been minimized, and openings are more utilitarian in their appearance.

Windows. The two most common types of windows are the double-hung and the casement, with the large fixed or picture window being reserved for special vistas. To these should be added the window-like wall of the contemporary house where a major portion of a wall is composed of glass, either in sheet or glass block form. Naturally most of the sections of this window-wall will be fixed and only a few will be movable or ventilating units. The frames of all these various types may be made of wood, steel, or aluminum—the most common materials today.

The double-hung wood window, as shown in Fig. 116, is probably still the most familiar type. In one form it consists of two sashes which are balanced by means of weights, cords, and pulleys, requiring a weight box in either jamb. A newer type has eliminated the weights and has substituted a balanced sash operated with spring action. The inner frame, sash, and weatherstripping are built as one unit and are installed after the plastering is dry. The outer frame is installed during the erection of the framework of the house. The screens and storm sash come with the windows to form a complete unit and design. With all types of windows care should be taken that the joints around the outside frame fit as closely as possible and that they are caulked with a compound to make them weather-tight.



U. S. Gypsum Co.



National Oak Flooring Assoc.

FIG. 116 (*above*). Double-hung window in a frame wall.

FIG. 118 (*below*). Colonial doorway with fan and side lights.

Brick Mfgrs. Assoc. of New York

FIG. 117 (*above*). Steel casement window in a brick wall.

FIG. 119 (*below*). Hooded entrance of house shown in Fig. 85.

Casement windows have some portion or all of the window hinged for ventilation, as illustrated in Fig. 117. They usually open out instead of sliding up and down as do the double-hung windows. The casement which opens in offers a difficult problem in connection with making it watertight. In the large casement windows, the center unit opens while those on each side remain fixed. Screens are installed on the inside and the operating hardware projects through the screen. Steel sashes are said to be colder in the winter than wood sashes and are sometimes more difficult to weatherstrip, but they are considered by many to be more durable and easier to operate. They also seem to harmonize in a very satisfactory manner with non-traditional houses.

Windows come in many stock sizes, so that it is not necessary to buy special sizes for the average house. The double-hung types vary in width from 1 foot 8 inches to 3 feet 8 inches and in height from 3 feet to 5 feet 6 inches. If there is an average size, it is probably about 2 feet 10 inches by 4 feet 6 inches. Steel casement sash may be one to six lights wide or 11 inches to 4 feet 7 inches, and one to six lights high or 1 foot 1 inch to 6 feet 1 inch. An average size would be about 3 feet 1 inch by 4 feet 3 inches.

Doors may be either exterior or interior, glazed or unglazed. They consist of the door itself and the frame and trim. Naturally they should harmonize with the architecture in appearance and design. Paneled doors of various types are usually used with traditional architecture, while the flush slab doors, veneered, stained, or painted, harmonize with contemporary non-traditional treatment. Paneling, which may consist of the usual four or six panels, or variations of different kinds, adds interest to the door. Doors of all kinds may be painted, stained, or finished natural, depending upon the scheme of decoration. They may be obtained in a number of stock sizes and designs which are usually quite satisfactory for the average home. Interior doors vary in width from 2 feet or less for small closets to 2 feet 4 inches, 2 feet 6 inches, and 2 feet 8 inches. They may be 1¾ to 1⅞ inches thick. An average height is 6 feet 8 inches. Exterior doors are usually larger and heavier and may be glazed for additional light and vision. A standard size is 3 feet by 7 feet by 2 inches.

Roofs. These final shelters for a building may be classified according to their shapes and materials. The various types are:

1. Shed roof, or one with a single slope.
2. Gable roof, which consists of two slopes which, in turn, form a ridge and gable ends.

Aluminum Company of America

Brick Manufacturers Assoc. of New York

FIG. 120 (*above*). Aluminum sash for corner windows in a non-traditional residence.
FIG. 121 (*below*). Successful composition of double-hung regular and corner windows with a non-traditional entrance.

3. Hip roof, or one which consists of four slopes which form a peak or ridge.
4. Gambrel roof, with a gable at each end formed by each slope being bent into two slopes, as exemplified by the Dutch Colonial treatment, shown on page 300.
5. Flat roof, characteristic of non-traditional architecture.

The sloping roof provides an attic space for additional insulation and gives the long-accepted traditional finish to a house, as shown in Fig. 111. It also sheds moisture in the most efficient manner. The flat roof may sometimes be the least impervious to water but it emphasizes the horizontal lines of a non-traditional house and creates desirable terraces and decks. (See Fig. 80.)

The most common materials used in the construction of modern roofs are: shingles of wood, asphalt, composition, asbestos, tile, and slate; metal roofs of copper, zinc, and tin; composition roofs in rolls.

Pitched Roofs. Wood shingles are inexpensive, durable, and attractive. They are usually made from cedar, cypress, and redwood, cedar being popular because of its straight even grain. They are usually laid 4½ inches to the weather and are nailed with hot-dipped, zinc-coated iron nails. They may be treated with oil and creosote stains for further durability and added color and beauty.

Asphalt composition shingles are made of felt combined with asphalt and covered with gravel. They come in different colors and are laid in strips to simulate regular shingles. They incur less risk of fire than wood shingles, but the cheaper grades with paper base will curl and fade.

Asbestos shingles are made of asbestos rock fiber and asphalt or cement combined under hydraulic pressure. By the use of various colors and textures, they may be made to imitate slate or wood shingles. They are very durable and are fire-resisting.

Tile roofing units come in many forms and colors. They are baked ceramics and may be flat and shingle-like or curved in the shape of half cylinders.

Slate roofs are among the most expensive and, in the better grades, the most durable of roofings. They may be secured in various weights and colors to form a permanent and fireproof roof. Slate and tile roofs should be laid by experts for they tend to work loose with the action of wind and freezing.

Metal roofs with standing or flat seams may be used on sloping or flat surfaces. Copper is very durable, except near the sea coast, and is attractive in appearance.

Flat roofs are often built up with layers of tar or asphalt compositions

surfaced with gravel, tile, or slate. They may also be covered with sheet metal or painted canvas. A built-up roof may be laid over wood construction and sheathing or over a concrete slab. This kind usually consists of three to five layers of rag felt saturated with tar pitch or asphalt, each layer receiving a mopping of hot tar or asphalt. The top is finished with gravel if it is not to be used for circulation or with tile if it is to be used as a deck or terrace.

Precautions. The size of the roof rafters and the slope of the roof will vary with the materials. The lightest construction may be used with wood shingles while heavier members must be provided for tile and slate. Shingles of any kind should not be used if the slope is less than 5 inches vertical to 12 inches horizontal.

Care should be taken to flash all places where there is a change in the direction of the roof or a change in materials. Flashing consists of strips of copper or galvanized iron placed in the valleys formed by the intersection of two slopes, around chimneys, and where the roof meets side walls and dormers. It should be carried up well under all surfaces to prevent the direct and capillary action of water.

In general, it is desirable to avoid complicated roofing with several different pitches to the slopes and breaks in the roof lines. Simple continuous surfaces are more attractive and much less expensive. A story-and-half house with its dormers contains less cubage than a full two-story house, but the saving is usually offset by the additional cost of labor in the construction of dormers.

Interiors

Surfaces. The structural system of a house holds it together and supports the space-enclosing materials and the roof. The exterior walls afford physical shelter and personal privacy. The interior treatment contributes to the comfort and enjoyment of the occupants. The treatment of floors, walls, ceilings, and interior finish is a matter of both utility and personal expression. The appearance of these surfaces has been discussed in Chapter 26. Now we shall confine our remarks to their physical qualities.

Floors. The laying of finished floors, one of the last operations in the construction of a house, should not be permited in a cold damp building lest warping occur. The diagonal subfloor, well-nailed, should first be covered with waterproof building paper before a hardwood floor is laid. The hardwood floor should be thoroughly kiln-dried and of good stock, although the most expensive grade is not necessary. Sometimes very interesting effects can be secured by the use of flooring which shows more grain and

pattern irregularities. White and red oak are the most popular woods for residential construction, and they usually come with the edges and ends tongued and grooved. The common sizes are 1½ inches, 2 inches, and 2¼ inches wide and 13/16 inches, ⅜ inch, and 5/16 inch thick. The thicker variety is more expensive but produces a better floor. However, mere thickness alone will not overcome creaky floors, which result from insufficient nailing of subfloors and finished floors.

Random-width flooring, which seeks to imitate the plank flooring of Colonial days, consists of boards of varying widths with V joints. Floors of this type may be very attractive, but the wider boards sometimes have a tendency to warp. After the orthodox oak flooring is laid, it must be sanded, stained, and shellacked or varnished. A good grade of waterproof varnish or lacquer gives a durable finish to floors for residences. There are also various types of prefabricated wooden floors on the market. These come in small square or rectangular units already stained and finished, and may be combined to form interesting patterns similar to the floor in Fig. 47. They are usually set in a mastic compound to form a durable surface.

Other popular floors are composed of linoleum, rubber tile, cork tile, and ceramic tile. Linoleum is composed of linseed oil, powdered cork, gums, and color pigments. Usually a felt covering is laid on the wood floor or concrete slab, and the linoleum is cemented to this base. Linoleum is durable and colorful and has a wide use in the modern home.

Cork tile is composed of cork compressed and baked. Its natural warm brown color makes it pleasing in appearance but it is more absorbent than linoleum. Rubber tile, which is also laid in a waterproof cement, is often made with marbleized effects, which combine well with certain schemes of interior decoration, as illustrated in Fig. 69.

Tile floors made of baked ceramics have become so familiar through their use in bathrooms that they need little discussion. Great strides have been made in the manufacture and appearance of tiles during the last few years. The white tile floors of a generation ago are disappearing and are being replaced by those with a wide variety of colors and glazes. Tile floors, usually reserved for bathrooms, lavatories, and kitchens, should be laid on a concrete slab to avoid cracking and to make a durable, waterproof surface.

Walls. These interior surfaces may be plastered, or covered with linoleum, tile, plywood, or wood paneling. The service rooms of the house may need tile or linoleum, while wood in some form or another may be

a more interesting and pleasant treatment for the living areas. However, plastered walls are still the most popular and merit a brief description.

Plaster is usually applied in three coats—the scratch coat, brown coat, and finish coat—to wood and metal lath and in two coats—the scratch and finish coats—to masonry walls of concrete, brick, tile, and concrete blocks. Wood and metal lath, plaster board, and insulating board are the popular surfaces to which plaster is applied. Plaster board consists of sheets of gypsum and fiber usually covered on the outside with paper. Wood and metal lath offer open spaces and corrugations which permit the plaster to key itself to the base material. Regardless of the type of lath, metal corner beads should be used to protect projecting corners and angles from being easily broken. Ordinary interior plaster is usually lime mortar, or some form of gypsum derivative. Prepared plasters contain some fibrous material, like cattle hair, which forms a bonding element and helps to prevent cracking.

What is now called "dry construction" is the use of wall boards and plywoods in the place of plastered walls, as shown in Fig. 30. These surfaces are painted or covered with linoleum, fabrics, or papers, or finished with stain and wax if the board is veneered with wood. Their use permits speed and economy in construction.

Millwork. After a plastered interior is thoroughly dry, the millwork is ready to be installed. In the traditional house of a generation ago this was a long and costly process, but in recent years there has been a tendency to eliminate or simplify the wood trim. Millwork consists of interior doors, the trim around doors and windows, and the bookcases, seats, cupboards, stairways, and mantels which complete the interior, as shown on pages 241 and 348. The woods most commonly used are white pine, gum, and poplar for woodwork which is to be painted. These are easily worked and lend themselves readily to the joinery, mortising, and shaping which is necessary in the mill and on the job. Mahogany, oak, walnut, redwood, and knotty white pine are often used where the wood is to be merely stained or finished natural.

The larger pieces of millwork and the moldings for bases, cornices, and jambs are run and assembled at the mill by mechanics skilled in the art of carpentry. However, there remain the erection at the building and the further necessity of good workmanship. Wood trim should be painted on the back to prevent absorption of moisture, and care should be taken to insure that all joints are fitted tightly and all surfaces sanded smoothly.

The hardware of doors, windows, and cases should harmonize in appearance, scale, and design with the rest of the house. The quality should be

as good as financial limitations will permit, for the cheaper grades of locks, handles, and pulls are often made of poor materials with thin washes of brass or chromium for the finish instead of the heavier plating of the better variety. Colorful plastics are now being used extensively in connection with interior hardware.

Stairways. These constitute a means of vertical circulation and as such should be easy of ascent and well lighted so there will be no physical hazards. They may consist of one of four types: (1) the single flight, (2) the L-shaped with one landing and one flight, (3) the U-shaped with one landing and two flights, and (4) the curved stair. These may be open or enclosed, the open type having one side open with only a balustrade or rail, the closed type being carried between two walls. The choice between the various types depends upon the plan and the best method of reaching the most convenient place on the second floor.

Ease of ascent and desirable head room are probably the two most important problems encountered in the design of stairways. First of all, it is necessary to establish a desirable relationship between the tread and riser, or between the horizontal and vertical elements of a stairway. The riser may vary from about 7 inches to 8 inches while the tread, including the nosing, should not be less than 10¼ inches. The average dimensions are about 7¼ inches by 10¼ inches. There is a rule that the sum of the tread and riser should equal 17½ inches.

In the average house, the distance from floor to floor is about 9 feet 6 inches, requiring about fifteen risers of 7¼ inches each. Since there is one less tread than risers, this means that there are fourteen treads, or about 12 feet of run. The ordinary stairway, exclusive of landings, thus requires a plan area of approximately 4 feet by 12 feet.

Poor planning too often results in inadequate head room. It is necessary that head room be adequate both actually and psychologically in order to avoid physical and mental hazards. Scale drawings should be made of the slope of stairways in order to insure sufficient space for convenience and appearance. The vertical clearance between the nosing of the tread and the nearest ceiling or obstruction should not be less than 7 feet.

Fireplaces. A fireplace consists of the opening itself with its surrounding masonry and the decorative mantel. The fireplace may project into the room or it may be flush with the inside wall so that the brick chimney is on the outside. The latter arrangement is shown in Fig. 124. The fireplace opening is lined with fire brick while the hearth and facing may be of marble, tile, slate, stone, or brick. The mantel is usually of wood, with or without a shelf.

California Redwood Assoc.

General Electric Co.

West Coast Lumbermen's Assoc.

FIG. 122 (*above*). Millwork in house in Fig. 90. Reynolds & Chamberlain, Architects.

FIG. 123 (*above*). Stairway of house in Fig. 46, showing risers, treads, and rail.

FIG. 124 (*below*). Colonial type fireplace with red cedar paneling. Graceful treatment. W. J. Bain, Architect.

The opening of the fireplace may vary with the scale of the room. The fire space should not be too deep or too shallow, or the fireplace will be either inefficient or troublesome. The following table suggests possible standard proportions:

3 ft. wide	2 ft. 6 in. high	1 ft. 6 in. deep
3 ft. 6 in. wide	2 ft. 8 in. high	1 ft. 8 in. deep
4 ft. wide	2 ft. 10 in. high	1 ft. 10 in. deep

There is a desirable relationship which should exist between the opening and the flue lining. If the flue is too large or too small, the fireplace may be inefficient or may not draw well, and thus may smoke. The opening of the fireplace should not be larger than twelve times the area of the flue; for a 3 by 4 opening (12 square feet), the flue lining should not be less than 1 foot square.

The sides of the fire space should be splayed or should slope in toward the back at about a 25-degree angle. The back, above an 8-inch or 10-inch level, should slope forward toward the top. All this helps to deflect the heat into the room and to increase the efficiency of the fireplace.

The chimney should be provided with a smoke shelf to stop any down draft and to prevent smoking. This shelf is located just above and back of the damper, above which is the pyramidal smoke chamber. The latter should have a smooth finish and a steep slope to accelerate the flow of smoke. The flue lining need not be absolutely vertical but it should be as straight as possible. The top of the chimney should be at least three feet above any near-by roof ridges. The avoidance of a smoking fireplace is due to careful attention to many such small details.

The design of the facing of the opening, of the hearth, and of the mantel itself is determined by the character of the room. The importance of the fireplace as the focal point of an interior calls for a good job of millwork and for excellent workmanship in connection with the installation of the marble or brick and the wood trim.

Chapter 36

MECHANICAL EQUIPMENT

Present-day mechanical equipment distinguishes the modern house from an obsolete one. If it were not for modern heating, ventilation, plumbing, and lighting and their influences, the houses of today would not be much unlike the homes of one hundred years ago. The same wood shingles, floors, and trim, the same glass in the windows, and the same paper on the walls characterizes the dwellings of this age and those of yesterday. The most significant changes have been in those mechanical devices which contribute to convenience and comfort.

Each year brings new advances in the technique of heating, lighting, and sanitation. In retrospection we have seen fireplaces, stoves, and gravity furnaces, or candles, kerosene lamps, and gas lights, or springs, wells, and hand pumps. In forecasting, we can only guess at the appearance and the efficiency of our mechanical equipment of the future. There are constant improvements in all those appliances which have become so essential to our peace of mind and comfort of body. Because of these frequent changes, we shall attempt only a general discussion of the subject, leaving for home builders, students of architecture, and architects the task of keeping in touch with the latest developments in the field of mechanical equipment.

Heating and Air Conditioning

Most of the houses in this country must be heated in winter. The method employed comes under one of the following two types:

1. Direct heating:
   Wood, coal, oil, or electric stoves.
   Fireplaces.
   Pipeless furnaces.
2. Indirect heating:
   Source of heat in basement or utility room with heat carried by air, steam, or water.

Modern heating involves more than mere heating, which is no longer sufficient. Modern "air conditioning" regulates the humidity. It heats, filters, and circulates the air in winter, and, by using part of the same equipment, cools it in summer. Thus the factors to be considered are:

1. Temperature:
   Heating to approximately 70° at knee height with a relative humidity of about 50 per cent.
   Cooling by means of circulating cooled and dehumidified air.
2. Humidity:
   Adding of moisture in winter. Relative humidity of 30 to 50 per cent of complete saturation is desirable in an efficient system. If moisture is not added, relative humidity may drop to 10 or 15 per cent, which is too dry and requires a higher temperature for comfort.
   Dehumidifying the air in the summer, by means of filters or other mechanical methods which absorb the excess moisture.
3. Cleanliness:
   Filtering the circulated air to remove dust and dirt.
4. Circulation:
   Forced circulation to insure an even distribution of heat.

There are now available medium-priced units for winter air conditioning and more expensive units for summer air conditioning. However, the designs of these various appliances are changing so rapidly that those interested should investigate the current types on the market.

Systems. The most common systems of heating for residences are known as

(1) warm air; (2) steam; (3) hot water,

and the fuel used may be coal, coke, oil, and gas. Any fuel may be used with any system, and the control may be by hand, semi-automatic, and entirely automatic. The use of oil and gas and the development of mechanical coal stokers have taken practically all the drudgery out of heating.

Warm Air. A modern warm-air furnace consists of (1) the combustion space or the fire box; (2) the heating space above and around the fire box, which also contains the humidifying unit; (3) the circulation unit, which houses the fan and the filters. From the furnace to the various rooms are carried the supply pipes and the necessary return ducts to complete the system of circulation. The supply pipes should be as direct as possible, without too many sharp turns, and their sizes should be estimated in accordance with the volumes of the rooms. The registers should be located to give even distribution of heat in the room, either near the floor or high

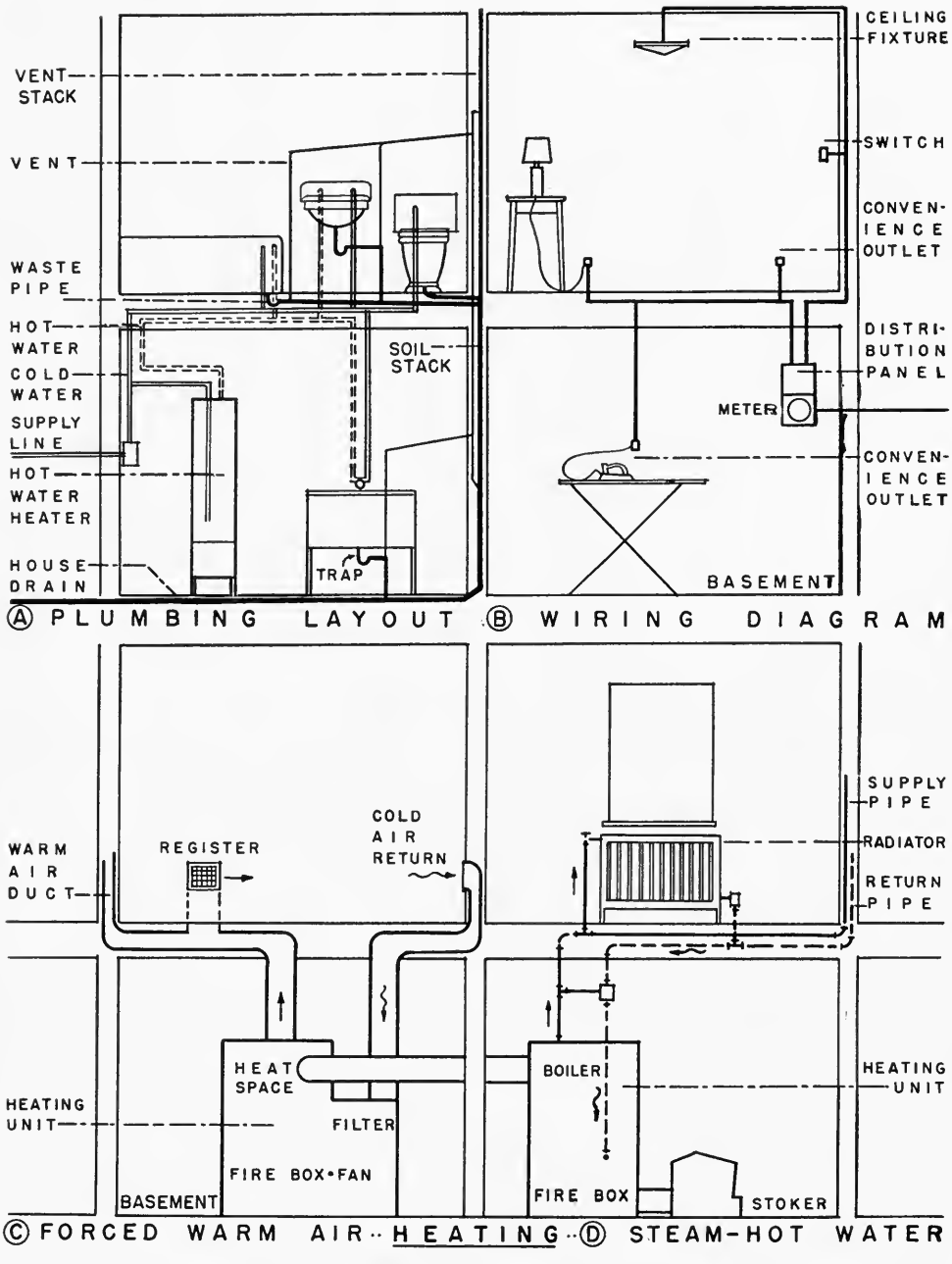


FIG. 125. The fundamentals of the various branches of mechanical equipment showing their different parts and the locations with reference to the walls and floors of the building.

in the wall. The openings for the return ducts should usually be placed on the opposite side of the room from the supply registers to insure a movement of warm air across the room and eliminate unheated areas. Return ducts should be provided from all the principal rooms except the kitchen and bath, and their capacity should equal or exceed that of the supply pipes. (See page 352.)

Steam. In a system of this kind, it is necessary to have a fire box and a boiler for the generation of steam. The steam is circulated to the radiators under pressure. The one-pipe system with a single pipe acting both as supply and return is the cheapest but not the most efficient. The two-pipe system has both a supply and return. The condensation is carried back to the boiler by a line separate from the one which takes the steam to the radiators. This results in better circulation. The vapor-vacuum is a variation of the steam system. A partial vacuum is created by drawing the air and condensation from the return lines which produces a more even circulation and maintenance of heat.

Hot Water. This is similar to steam except that the heat is carried by water instead of steam. It is the simplest system to operate and the most economical of the radiator types as far as cost of maintenance is concerned. The temperature of the water is more evenly controlled, but the system heats and cools more slowly than with steam.

Split System. This is a combination of a steam or hot-water system and a warm-air system. Some rooms may be heated by one, some by the other. Or both may be used in a single room. One of the objections to a steam or hot-water system is that it does not afford a circulation of air or an opportunity of providing the proper humidity. The addition of a modified warm-air system provides forced ventilation of humidified and filtered air, thus eliminating the objections of a single type of heating.

Some success has been achieved by what is known as the panel system. Hot-water pipes are concealed in the ceiling or in concrete floors, which by gradual and constant radiation heat the room to an even temperature.

Design. The design, location, and painting of radiators bring up problems which require the services of a heating engineer. The use of certain paints on radiators will lessen their ability to give off heat. The concealing of radiators behind grilles makes a more attractive room, but their heat-transmission efficiency may be reduced by 30 per cent.

There are many factors which enter into the design of a heating system. The size of furnace, supply and return lines, registers, and radiators depend upon the size, location, orientation, and construction of the house. The severity or mildness of the winters, the relationship of the rooms to the

sun and winds, the amount of glass area, and the kind of insulation are variables which must be taken into account. In determining the actual sizes of the various elements of a heating system, the volumes of rooms are estimated together with the heat loss due to direct leakage around openings and to transmission through walls and glass. The amount of heat transmitted can be reduced by double glazing and insulation, the leakage by tight construction. When all the foregoing estimates are made, a complete heating unit best adapted to the particular situation may be organized according to the principles of heating and ventilating engineering. The complex problems associated with the selection and design of heating plants, proper humidity, condensation of moisture on cool surfaces, insulation, double glazing, and heat losses may best be left to those familiar with such matters.

Lighting and Wiring

Electricity is the modern source of light, heat, and power. The average family is interested in it for light and power. When the general plan of the house is being developed, the number and location of the electric appliances should be studied. A lighting and wiring plan should be made showing the relationship between doors, windows, furniture, and convenience outlets. This may be done, as described on page 155, by cutting out pieces of cardboard to represent furniture, which may be arranged in the various rooms according to the needs of the family. Or plans may be made with the furniture sketched in and the location of lamps and base or wall plugs shown as in Fig. 22*C*. By either of these methods, it is possible to analyze the lighting requirements of a household in terms of its interests and the resultant furniture groupings, all based upon the following typical activities:

> Reading, studying, sewing, shaving, dressing, bathing, sweeping, dusting, washing, ironing, working in the kitchen, playing games, etc.

Types of Lighting. There are two basic types of lighting, with an additional combination of the two, as follows:

1. Direct lighting, which is the most efficient but may be productive of glare and shadows. An exposed ceiling light is an example of this type.
2. Indirect lighting, which is the least efficient but the most pleasant. With a light source of this kind, the light is entirely reflected from adjacent walls and ceiling. This is done by turning the reflecting bowl up so that little direct light falls upon the objects below. Indirect lighting results in a uniformity of spread and produces soft shadows with little glare.

Built-in indirect lighting has many advantages but is much more expensive than portable units.

3. Semi-indirect lighting, which is a combination of the two foregoing methods. In this a portion of the light is permitted to escape downward through a translucent bowl or may be directed downward from a secondary source.

DESIGN. The design of a lighting and wiring system depends on

1. Wattage required.
2. Number of outlets.
3. Reflecting quality of walls and ceilings.
4. Type of fixtures.

The subject is too technical to discuss at any length here, but we can at least make a few fundamental suggestions. The urban public is protected by building codes which usually insure the safety of the electrical installation, while the electrical contractor should provide wiring which is heavy enough to carry the load for present and future needs. So let us indicate only a few desirable conditions.

Light should be judged both as to its quality and quantity, or its softness and its amount. It may provide general or local illumination. It should be designed to avoid excessive brightness, a fault almost as unpleasant as dimness. Glare is also a notorious offender, often produced by wall brackets at eye level. As a general rule, there should be no unshaded light sources. Also there should not be too much contrast between brightly lighted and dimly lighted areas. Concentrated illumination should not exceed general illumination by more than ten times. On the other hand, it is desirable to avoid uniform intensity or an equal distribution of light. The light may be too flat and bright and there will not be enough contrast in the room to provide interest and variety.

General Illumination. This may be best secured by indirect lighting or something which approaches it in effect. Cove lighting, lamps or ceiling fixtures which direct the light toward the ceiling, or built-in fixtures may be used to obtain the necessary and desirable effects.

Local Illumination. Well-designed direct or semi-indirect units in the form of table, desk, and floor lamps will give concentrated illumination in specific places for definite activities. Lamp shades should have white linings in order to reflect the light instead of absorbing it. The shade should be open at the top to help light the rest of the room and to minimize the glare. The shade should also be of the correct opaqueness to eliminate the possibility of the lamp's appearing as an excessively bright spot in

the room. With both general and local illumination, there is an increased popularity of built-in units in or near the ceiling and built-in fixtures at the head of the bed, in the dressing alcove, and in connection with study areas, bookcases, desks, and kitchen work areas.

General Requirements. It is possible to make a long and detailed list of the number of lights and outlets needed in every room and closet in the house. However, common sense and experience with such everyday requirements will suffice in this connection and we shall indicate only briefly the most fundamental needs:

1. For the living room, if ceiling fixtures are desired, one ceiling outlet for small rooms, or two outlets if the length is more than 1½ times the width. Also convenience outlets as indicated later.
2. For other rooms, closets, and porches, one ceiling outlet for general illumination, and the necessary convenience outlets. The kitchen may have local lighting above work centers in addition to general illumination. Bathrooms may also have a wall outlet on each side of mirror.
3. In rooms with one door, one single-pole switch is the only switch needed. All switches should be near the door and on the side closest to the path of circulation. In the living room, the convenience outlets used for illumination may be switched to a single control at the door.
4. In rooms with two doors more than ten feet apart, two three-way switches should be installed for added convenience. With three-way switches the illumination may be controlled from either switch. Stairways and entrances should be equipped with multiple switches.
5. The major rooms of the house should be provided with sufficient convenience outlets, or base or wall plugs. There should be one for each ten lineal feet of wall space, and no space unbroken by doors should be more than five feet from an outlet. Although any such rule may be modified by the location of furniture or openings, it is better to have too many outlets than too few.

Minimum Lighting. Research by authorities on lighting has established definite recommendations for the amounts of light needed for various household activities. They are based upon the foot-candle as the unit of measurement. The foot-candle is the amount of light shed by a candle upon a surface one foot square one foot away. The light source may be either a Mazda or a fluorescent unit producing either a warm or a white light. Simple light meters, similar to a desk thermometer in appearance, are available for the purpose of checking the amount of illumination obtained from various units. This practice is recommended, since each home is a special problem. The variable factors are the colors and textures of

the walls, ceilings, and furniture. Ceilings of flat white reflect about 85 per cent of the light, walls of ivory about 70 per cent, those of medium blue, green, or gray only about 35 per cent.

Recommendations. The following list shows the number of foot-candles required for various activities and approximate lamp wattage necessary to secure the proper lighting:

Activity	Foot-Candles	Outlet Wattage
General illumination for circulation.	5 to 10	60 watts or more in ceiling fixture, depending on size and color of room.
Casual reading, writing, ordinary sewing, games and card playing, kitchen work, washing and ironing, bench work.	10 to 25	60 watts in approved table lamp, or near-by wall outlet; 100 watts in floor lamp.
Ordinary reading, studying, shaving, dressing.	25 to 50	100 watts in approved table lamp; 60 watts in special fixtures.
Prolonged sewing, reading, drafting.	50 to 100	150 watts in approved table lamp.

It should be realized that all these figures are only approximate and may vary considerably with the type of shade or reflector used and the distance of the light source from the object upon which the light falls. For instance with light ivory shades on a table lamp, the following results may be obtained:

Wattage	Distance between Light Source and Meter	Foot-Candles
60	12 in.	50
60	24 in.	15
100	12 in.	90
100	24 in.	30

Attention is called to the fact that the amount of illumination only a short distance away from a lamp is considerably less than that a little nearer the light source. For instance, a reading of 50 foot-candles on a table top under a 100-watt lamp may drop to 15 foot-candles on a book held by a person in a near-by chair. It is recommended, therefore, after the furniture and equipment for the various activities are installed, that lamps of various wattages be checked with a light meter in order to ascertain whether or not sufficient light is obtained for the different household tasks.

Power Outlets. In addition to lighting, electricity furnishes power for the various mechanical appliances used about the house. Ample provision must be made for these conveniences, both in the size and design of the wiring and location and number of the outlets. If the additional cost is not objectionable, the power outlets may be on a separate circuit, which will

eliminate the dimming of lights when a refrigerator or electric stove is turned on. In many homes, the convenience outlets of the lighting circuit are used for power appliances.

The following list suggests the provisions which should be made in the more important rooms of the house:

Laundry:
Washing machine, ironing appliances.
Basement:
Oil or gas furnace with forced circulation; automatic stoker. Work-bench appliances.
Kitchen:
Refrigerator, mixing and beating appliances; electric range and dishwasher, ventilating fan.
Dining areas:
Toaster, percolator, waffle iron.
Bedroom:
Curling iron, warming pads, vibrators.
Bathroom:
Electric razors and other appliances, the number being kept to the minimum since a damp tile floor is a good conductor of electricity and is a physical hazard when current is grounded due to defective cords and plugs.

It should be needless to say that much thought should be given to the location of the various power outlets. They should be spaced with reference to their use and placed at convenient heights.

Wiring. After the lighting and wiring layout is completed, it is time to think about the type of wiring. The home owner is protected to some extent by the ordinances of municipalities and the requirements of fire underwriters which insist upon certain minimum standards of materials and workmanship. Anything above the minimum depends upon the efforts of the architect and the electrical contractor, and, for those whose knowledge of such matters is negligible, it is usually necessary to depend upon their advice. It is obvious that the wires which carry the current must be insulated and protected. There are three common types of wiring:

1. Rigid conduit, which is the best, and consists of insulated wires in an iron pipe.
2. Flexible BX cable, which is in the form of metal strips wound spirally around the wires to form a safe and permanent covering.
3. Fiber cable, which is the cheapest and is made of woven fiber covered with asphalt.

The wiring system itself consists of the meter, the distributing panel with

its fuses, and the wiring to the fixtures. (See page 352.) At the location of each outlet is an outlet box which is the terminal for the wires and the connection for the switch, convenience outlet, or the fixture. The fuse panel or circuit breaker may be located in some convenient place in the basement or at the head of the basement stairs. In larger homes, there may be one on each floor to care for the outlets on that particular level. Regardless of the location, the various circuits on the fuse panel should be labeled for convenience in finding the cause of any trouble.

The size of the wiring in order to carry the required load is best left to an expert in this field. However, care should be taken to insure that the design is correct and that the wires will not be overloaded by future demands. A separate heavy-duty circuit should be provided for electric ranges, hot-water heaters, and air-conditioning equipment.

Plumbing

Plumbing has to do with sanitation, both personal and household. Its purpose is to bring in and distribute to the fixtures the supply of hot and cold water and to remove waste water and sewage. (See page 352.) Perhaps even more than with the other phases of mechanical equipment, the city dweller is protected by building codes and sanitary ordinances which specify the sizes, construction, and types of fittings and fixtures.

Plumbing System. As is typical with all types of mechanical equipment, circulation is the most important requirement. Water must circulate through pipes as heat does through ducts and electricity through wires.

Supply Pipes. These pipes carry the water to the fixtures, and their sizes are governed by the number of faucets to be operated. Supply lines in residences usually vary from ¾ inch to 1½ inches. They should be equipped with shut-off valves in the basement and below each fixture. They should not be carried in exterior walls where they may be exposed to freezing. If this cannot be avoided, they should be properly insulated. The choice of material for these pipes depends upon the temperature and the chemical aggressiveness of the water to be carried. Some water will corrode the pipe; other water will cause deposits and stoppage. Galvanized iron pipe is cheapest but is subject to corrosion. Brass pipe is more durable, but flexible copper tubing with soldered joints is now becoming more popular than any of the others.

Cold water is taken directly from the main supply pipe to the various fixtures, but hot water must naturally first be produced by a heating unit, usually gas or electricity. Water is heated by its circulation through coils of pipe in a heater. In an instantaneous heater, the water is heated only when

a faucet is open, causing circulation of water and an automatic lighting of a flame. This type is desirable for small homes where hot water is used only infrequently. The storage type of hot-water heater is more common than the instantaneous. A small heater with the usual coils is placed adjacent to or incorporated with an insulated storage tank which is kept full of hot water by thermostatic control. This tank may be of galvanized iron, but an alloy of copper and nickel is more durable. A tank of forty-gallon capacity is an adequate size for the average home but the size should be based upon the needs of the family.

Fixtures. These include the sinks, lavatories, water closets, and laundry tubs and bathtubs. The quantity may be determined by the size of the house and the number in the family. (See page 208.) If possible, it is better to have too many than too few, but one must weigh petty annoyances and inconveniences against costs. The quality of these fixtures is beyond the scope of this discussion. Science and art in industry are accelerating the changes in the design of plumbing fixtures, and an inspection of the products of the moment is recommended for those who plan and build. The cheapest fixture is made of cast iron or stamped steel with a glazed enamel surface. The next in price is one of vitrified china with a porcelain glaze, and the most expensive is a solid porcelain fixture. Because of its purpose, a water closet must be made of porcelain. A bathtub is usually made of enameled cast iron. Sinks may be constructed of enameled iron or steel, metal alloys, or stainless steel, each with its particular advantages and disadvantages. The faucets belonging to the various fixtures are the parts most frequently used and are the ones in which cheapness of materials and construction appears first. The life of a faucet is usually in direct ratio to its cost. The cheap ones do not wear well and soon leak and cause trouble. Faucets are only as good as the metal from which they are made. To endure they must contain sufficient copper and brass and should be plated with some material like chromium, not merely washed with a thin solution.

Waste Pipes. These receive the discharge from all the fixtures except the water closets and convey it to the house drain or soil or waste stacks. They should be of durable material and of sufficient size to discharge the waste quickly. A 2-inch pipe is a recommended size for the lavatory, tub, and sink.

Traps. Under all lavatories, tubs, and sinks and incorporated with the waste pipes is a device known as a trap. In a water closet, the trap is part of the unit itself. A trap is usually a bend in the waste pipe which retains enough water to prevent passage of sewer gas back through the fixtures and into the house. The water standing in the trap is called the seal and

must be deep enough to close the pipe completely. All fixtures and drains must have a trap, and every trap should have a clean-out in case of stoppage. Traps must be vented by a vent pipe carried out through the roof to prevent siphonage of the trap and also back pressure.

Soil Pipes. These carry the discharge from water closets and are usually 3 or 4 inches in diameter. Soil and waste pipes are usually of cast iron with lead-caulked joints. Soil pipes may be insulated to deaden the sound of running water.

Main and Branch Lines. The main line of any system is that part which receives the wastes or vents from fixtures or traps; the branch lines are those horizontal pipes from the fixtures to the main.

Stack. A stack refers to any vertical soil, waste, or vent pipe.

House Drain. This is the lowest horizontal piping, which receives the soil and waste and carries them to the house sewer and hence to the main sewer or to the septic tank.

In general, plumbing involves the combining of definitely specified materials and construction for the hidden portions with the more personal and variable factors of design and color for the fixtures. The planning of bathrooms, laundries, and kitchens requires the same careful thought as does the design of equipment for illumination and heating.

Chapter 37

EVALUATING A HOUSE

Contributing Factors. After a house is completely planned from the standpoint of function, construction, materials, appearance, costs, and finance, it is desirable to make a final check of all the contributing factors. A prospective home owner may feel the need of some concise method of evaluating a house which is already built, or a renter may desire some assistance in judging certain aspects of a rented dwelling. For these reasons, the following material is presented as a means of arriving at definite conclusions concerning the advantages and disadvantages of a home.

The following factors should be considered when judging a house:

Plan Arrangement

Convenience

Satisfactory room arrangements; rooms of correct size; proper cross ventilation; adequate wall spaces; sufficient natural light; satisfactory circulation; flexible plan; adequate storage spaces; proper orientation and exposures.

Construction

Foundations

Firm soil for footings; footings of adequate size; walls strong enough to carry load and dense enough to resist moisture.

Superstructure

Joists large enough and properly spaced to prevent excessive deflection, with necessary bridging and bearing area. Properly installed subfloors; vertical studs or prefabricated units of correct size; proper bracing and sheathing of stud walls; adequate framing around openings. Roof rafters of sufficient size and correctly braced.

Materials

Durability

Walls impervious to moisture, heat, freezing, and thawing; proper protection with paint or stain; adequate insulation; proper combination of

materials according to their natures and coefficients of expansion; fire-resistant materials. Joists protected from moisture and termites. Satisfactory pitch and shape of roof to provide proper drainage; roofing material resistant to effects of sun, rain, ice, snow, and wind; proper installation of flashing to prevent leaks. Finished wall materials capable of resisting effects of bodily contact and cleaning; proper protection with paint; correct relationship between nature of materials and frequency of use. Correct selection, installation, and finish of flooring materials. Millwork of well-seasoned wood, correctly installed and finished. Hardware and accessories of durable quality.

Mechanical Equipment

Size and quality

Heating plant of correct size and design; registers or radiators properly located with reference to furniture. Plumbing fixtures of correct type and conveniently located; plumbing fixtures and supply and soil lines of proper material and workmanship; adequate hot-water system; provisions for sewage disposal. Electrical wiring of correct size and specifications; proper number, quality, and location of fixtures and convenience outlets.

Appearance

Interior treatment

Pleasing proportions to rooms; wall spaces and openings properly related; harmonious textures and colors.

Exterior treatment

Satisfactory massing of exterior; pleasing proportions of walls, openings, cornices, and details; unity in design and use of materials; all façades well designed, instead of only the front; proper exterior expression of the plan; correct exterior character; harmonious color scheme.

Landscape treatment

House and site correctly related with reference to contours, boundaries, and existing trees; logical and pleasing landscape plan; simple but adequate foundation planting.

The Site

Surroundings

Neighborhood appreciating in value, not depreciating; adjacent houses similar in cost and satisfactory in design. Neighbors compatible in habits of cleanliness, orderliness, and quietness.

Conveniences

Adequate facilities for transportation, recreation, and shopping; convenient schools and churches; access to water, gas, and sewer.

Physical qualities

Shape and topography adaptable to economical planning and construction. Size adequate and without detrimental peculiarities.

Costs

Cost and quality

Justification of total cost in relationship to quality of materials and workmanship.

Cost and income

Correct ratio of two to three times the yearly income; ability of owner to build or buy without curtailing other desirable activities.

Upkeep

Materials and construction adequate to minimize cost of upkeep; correct relationship between size of yard, amount of landscaping, and time and money available for upkeep.

The foregoing factors are summarized in the evaluation table on page 365.

STUDY EXERCISES

1. Collect illustrations of different types of construction, showing the system and materials used.
2. Collect illustrations of and indicate preference for various kinds of exterior wall materials.
3. Collect three illustrated examples of each of the roofs discussed on page 341, and analyze their relationship to the accompanying type of house.
4. List the advantages and disadvantages of your own heating system, plumbing fixtures, and electrical convenience outlets, switches, and fixtures.
5. Collect illustrations and data about various types of heating systems, and investigate their prices and desirability for houses of various sizes and costs.
6. Select a specific house plan and locate the various radiators or registers and the switches, convenience outlets, and electrical fixtures in the major rooms and halls.
7. Collect illustrations showing diagrams of plumbing systems, including supply, waste, and soil pipes. Collect illustrations of plumbing fixtures and group them according to their material, finish, color, and price.
8. Select a definite house, evaluate it, and give it a score, in accordance with the method described in Chapter 37.

EVALUATION TABLE

	Poor		Average		Excellent	
PLAN ARRANGEMENT		12		18		25
Convenience of plan	12		18		25	
CONSTRUCTION		8		12		15
Adequacy of structure	8		12		15	
MATERIALS		5		7		10
Durability	5		7		10	
MECHANICAL EQUIPMENT		5		8		10
Adequacy and quality	5		8		10	
APPEARANCE		8		12		15
Interior and exterior design	5		7		8	
Use of materials	1		2		3	
Choice of colors	1		2		2	
Landscape treatment	1		1		2	
SITE		7		11		15
Type of neighborhood	4		6		8	
Conveniences and utilities	2		3		4	
Topography and shape of lot	1		2		3	
COSTS		5		7		10
Ratio of cost and quality	2		3		4	
Ratio of cost and income	2		2		3	
Upkeep	1		2		3	
		50		75		100

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